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SCIENCE
2023
5th Prim.
First Term



Contents

Theme One: Systems

Unit One: Interactions of Organisms

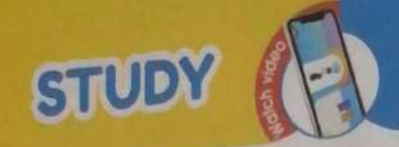
Theme Two: Matter and Energy

Unit Two: Particles in Motion











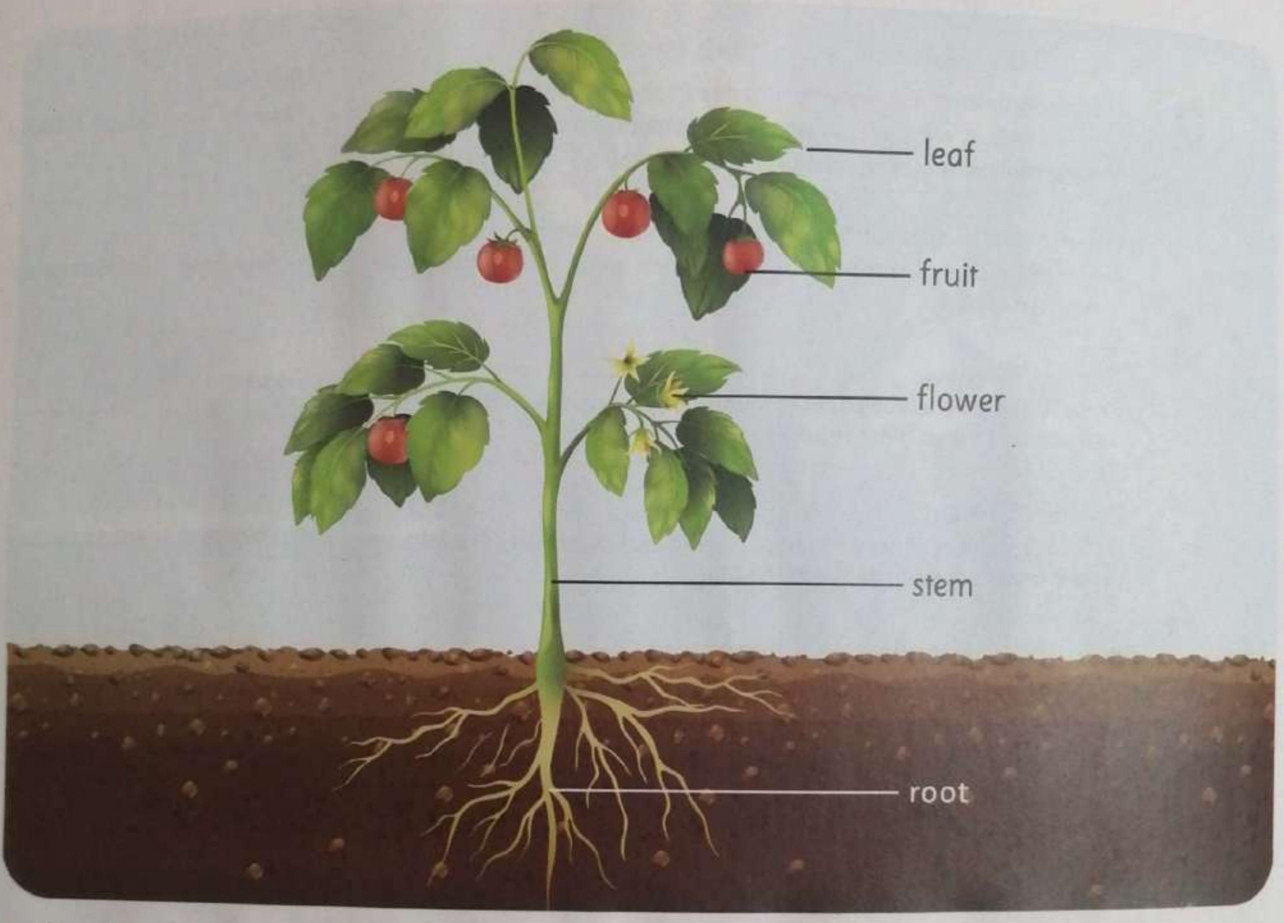
Lesson 1



Can You Explain?

- We have previously learned that, when a seed germinates, it grows into a whole plant, which consists of many parts.

Let's remember these plant parts



- The plant needs some materials to make its own food to perform its life processes like growth or reproduction.
- These materials needed are called plant basic needs.

Plant basic needs are "Water", "Air", and "Sunlight".

How do the structures of a plant use water, air, and light to perform life processes



- In this concept, we will learn how the unique plant structures and parts help the plant meet its basic need to make its own food.

Parents' Tips

Help your child explain what he/she already knows about the basic needs of plants and how these needs are met.

Germinate تنبت
Reproduction تكاثر
Structures أجزاء - تراكيب



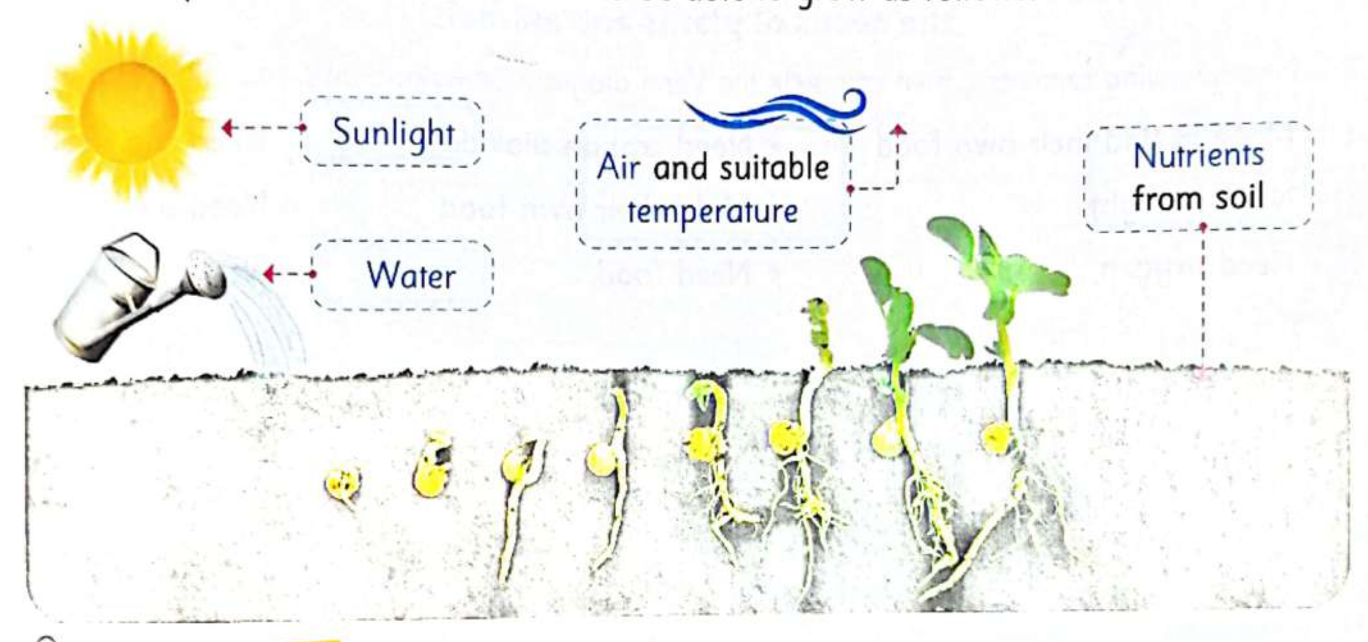
Activity 2 Tree Needs



- Can we plant a seed without knowing its needs, and whether the resources provided are suitable for it to grow? Yes ☐ No ☐

Preparing to Plant

- Plants need food as well as our bodies to grow and thrive. When we plant a seed, we must provide it with all its needs to be able to grow as follows:



Challenge

- Draw a plant model and show which structures allow it to use resources (meet its needs) to complete its life processes, then share your model with your classmates.



3 Digital Extension Activity

Growing

- For more knowledge about what a plant needs to grow well and strong, use the Egyptian Knowledge Bank.

4 Digital Extension Activity


Egyptian Knowledge Bank
بنك المعرفة المصري
https://study.ekb.eg/

Water in the Desert

- For more knowledge about the water resources in the desert and how plant structures perform and their adaptations to soak up water to grow and thrive, use the Egyptian Knowledge Bank.

Parents' Tips
Help your child ask questions and think about what he/she needs to plant a tree.

Thrive	يزدهر
Soak up	يمتص





Plants and Animals

- Both plants and animals have needs that enable them to grow, live, and thrive. Those needs may be similar or different in some ways.

Let's determine the similarities and differences between the needs of plants and animals

Read the following sentences, then complete the Venn diagram between plants and animals' needs:

- Move to find their own food
- Need sunlight
- Need oxygen
- ~~Need carbon dioxide~~
- Make their own food
- Need food
- Need shelter
- ~~Need air~~
- Need water

Animals

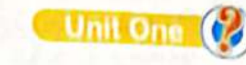
Both

Plants

Animals	Both	Plants
•	• Need air	• Need carbon dioxide ....
•	•	• ....
•	•	• ....

Parents' Tips

Help your child evaluate his/her prior knowledge about the similarities and differences between the needs of plants and animals.



Plant Needs

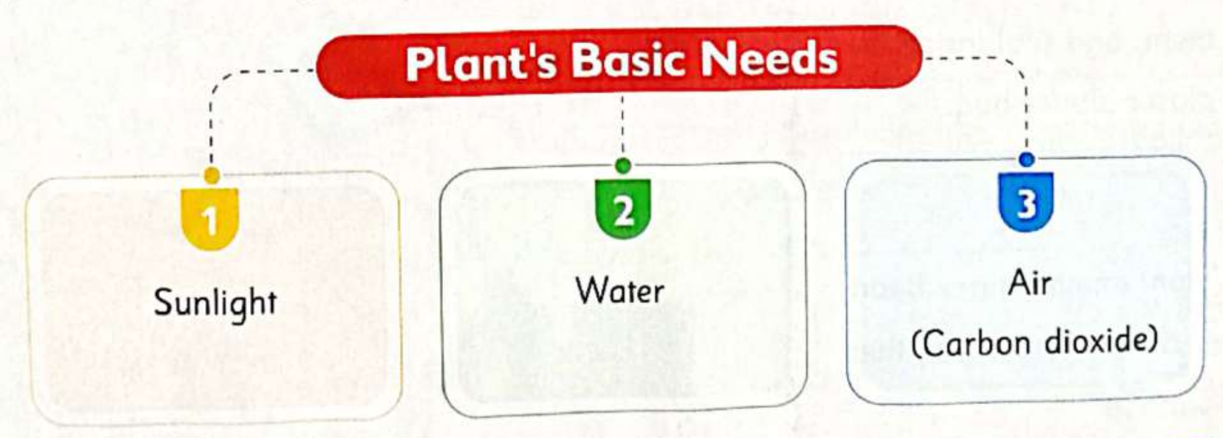
- Not all what the plant needs are "basic needs".

Let's determine what the plant's basic needs are

Look at the following table, then tick (✓) for the "basic needs" or tick (✗) for "not basic needs":

Item	"Plant's Basic Needs"	"Not A Plant's Basic Needs"
A forest		✗
Water	✓	
Carbon dioxide		
Oxygen		
Sugar		
Sunlight		
Suitable temperature		✗

So, from the following table, the plant's basic needs that enable it to make its food are:





Did you know that fruits and vegetables are the main source of most of the vitamins our body needs to grow healthy?









LEARN



Lesson 2



6 Activity

Hands-On Investigation: Do Plants Need Soil?

- There are some plants that can live in water and are called "aquatic plants".

Do all plants need soil to grow? Yes ☐ No ☐



Soil and Plant Growth

- Plants need water, air, and sunlight to grow, but the soil is not included as one of the basic needs.

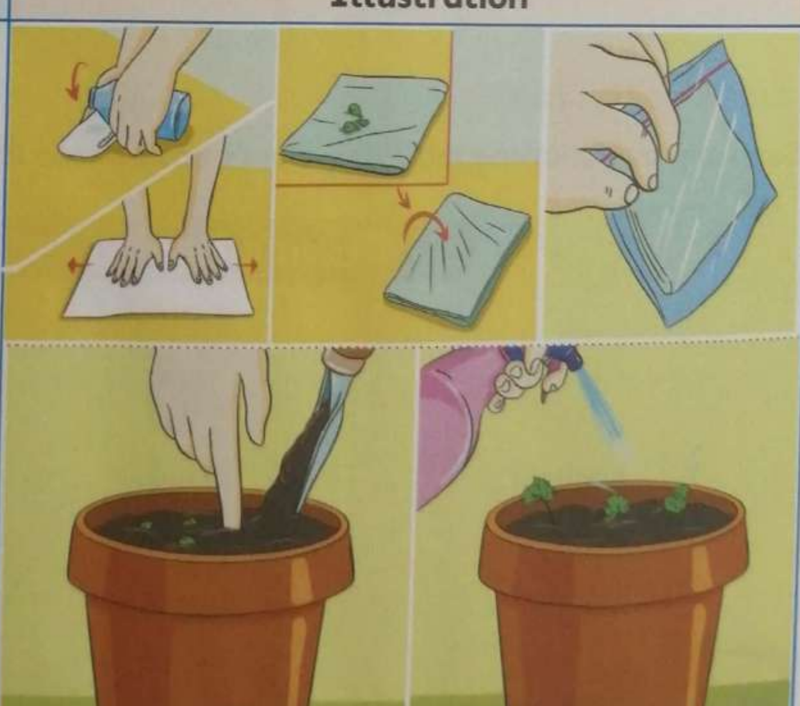
Let's conduct an experiment by germinating seeds in and out soil

Caution!! Follow the lab safety guidelines while performing an experiment.



Aim: Determine whether plants need soil to grow or not

Materials: Plastic plant pot – Soil (potting) – Paper towels – Plastic zipper bags – Water – Seeds (fava or beans)

Steps	Illustration
1 Place three bean seeds on the top half of a wet paper towel, then fold it to cover them, and seal inside the plastic zipper bag.	
2 Plant another three bean seeds in the soil pot, then water it.	

Parents' Tips

Help your child investigate what a plant needs to grow and survive by experimenting that soil is not one of the basic needs of the plant to survive.



3. Place them for several days in a place with sunlight, then check the growth of the seeds.



Observation:

The germination and growth of the seeds in the towel are similar to the growth of the seeds in the soil.

Conclusion:

- Seeds can grow without soil if they have water and sunlight.
- Soil is not one of the basic needs of the plant, but eventually, the plant needs soil or a replacement that provides it with minerals and other essential elements to grow.

How can plants grow without soil and be supplied with nutrients



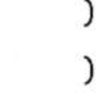
- Soil can be replaced by a full hydroponic system that provides a source of minerals and other essential elements to the plant.



Search the internet

- Search the internet to discover the advantages and disadvantages of growing plants in water, then share your research with your classmates.

Checkpoint



Put (✓) or (X) in front of each sentence:

1. Soil is one of the plant's basic needs. (   )
2. Plants can grow without the nutrients they obtain from the soil. (   )
3. Hydroponic systems can replace the nutrients that are taken from the soil. (   )

Cultivation زراعة	Hydroponic system نظام الزراعة المائية	Aquatic مائي





Lesson 3

7 Activity Hands-On Investigation: Sunlight: A Basic Need

- Plants can make their own food in the absence of light.

  Yes ☐ No ☐

- The plant can grow well and be healthy in the presence of light.

  Yes ☐ No ☐

Experiment Time

Photosynthesis Process

- Plants can make their own food by themselves through a process called photosynthesis.

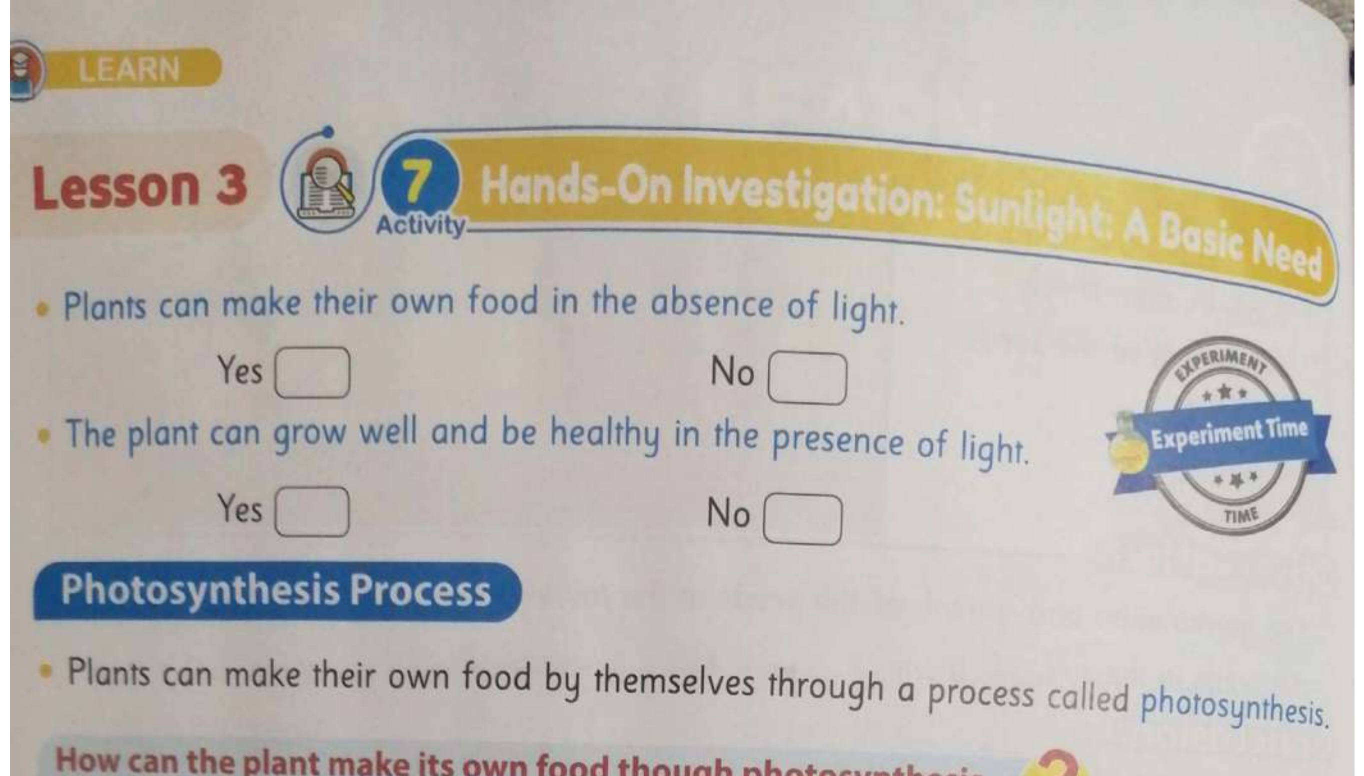
How can the plant make its own food though photosynthesis?

1. Green leaves collect sunlight and carbon dioxide from the air.
2. Plant roots absorb water from the soil.

All of these components combine together to produce:

a. Oxygen → Released in the air "Helps all living organisms breathe".

b. Sugar → Plant food "Gives the plant the energy needed to grow".



Sunlight + Carbon dioxide + Water → Oxygen + Sugar

Parents' Tips

Help your child identify the importance of sunlight for plant's growth.

Let's conduct an experiment to know if sunlight is important for plant growth or not



Aim: Determine the importance of sunlight for plant growth

Materials: 250 mL plastic cups – Seeds (fava or bean) – Soil for potting – water – permanent marker – ruler

Caution!! Follow the lab safety guidelines while performing an experiment.

Steps	Illustration	Observation
1 Bring 2 cups and add soil to both cups, then label them "Cup (A) and Cup (B)".	Cup (A) Cup (B)	
2 Place the seeds on the soil per cup, then cover each one with 2 cm soil, and pour the same amount of water "to moisten the soil".	Cup (A) Cup (B)	
3 Place Cup (A) in the light, then observe it daily.	Cup (A)	• The plant grows strong, and healthy with green leaves and tall stem.
4 Place Cup (B) in the dark, then observe it daily.	Cup (B)	• The plant grows weak, with less green, yellow, or brown leaves and a short stem.

Moisten يبلل



5 Record your observations in the data table as follows: "You can choose other factors".

Data Table

Date	Observation	Cup (A)	Cup (B)
.... /	Height	6 cm	2 cm
.... /	Leaves Color	Dark green	Less green
.... /	Leaves Shape	Many and large	Less and small
.... /	Plant Health	Strong	Weak

Conclusion:

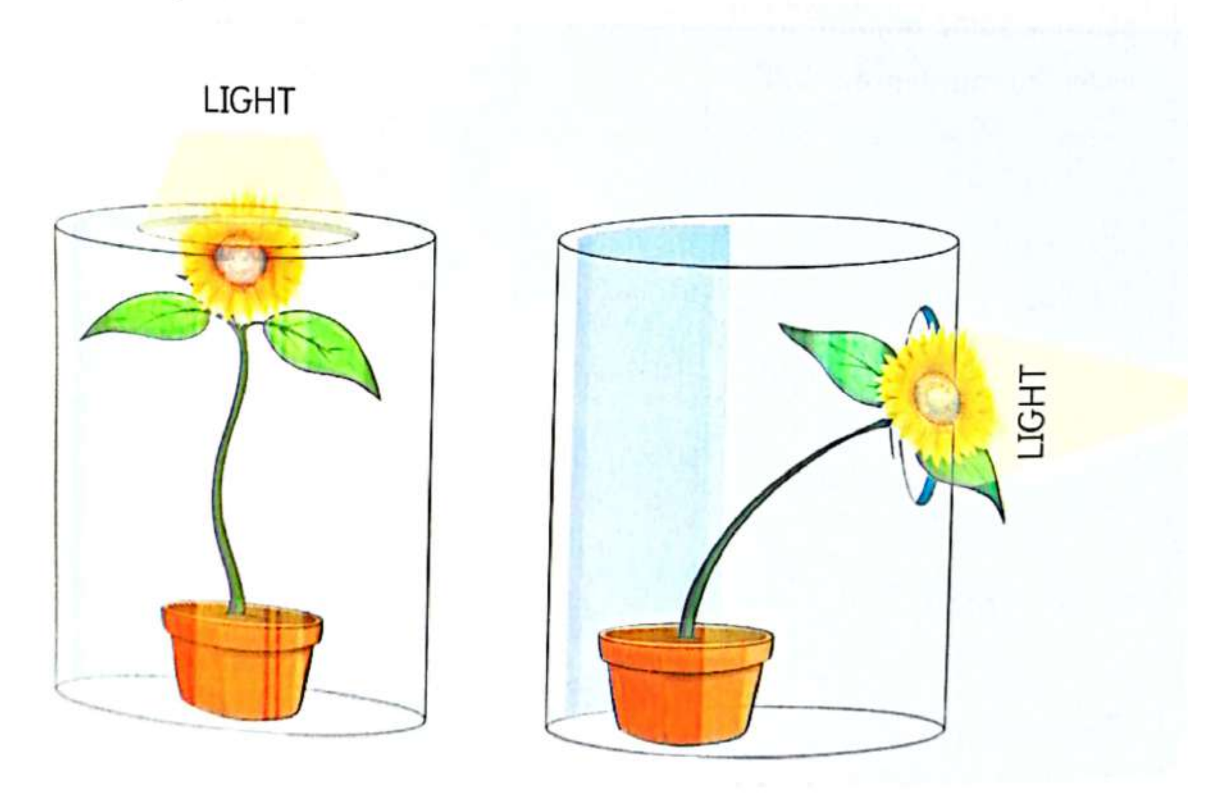
- Sunlight is the source of energy for plants, and it is important for making their own food to grow strong and healthy.

Let's observe a plant that demonstrates the importance of sunlight for plant growth

Example:

Sunflower

- The sunflower plant grows toward the sun and can also track the movement of the sun throughout the day.



- When the source of light changes its direction, the flower continually changes its direction with the movement of the sun to grow.



PRACTICE

Learn Exercise 1



1 Choose the correct answer:

1. All of the following are from the plant basic needs except ....
   a. sunlight b. air c. water d. shelter
2. Plants take .... from the air to make their own food.
   a. sunlight b. carbon dioxide c. water d. oxygen
3. Plants need .... to make photosynthesis.
   a. nutrients absorbed from soil b. sunlight
   c. water d. All the pervious answers
4. When the plant is placed away from the source of light, it grows ....
   a. strong b. healthy c. weak d. green
5. Hydroponic systems are used to replace the .... for the plant.
   a. soil b. sunlight c. water d. carbon dioxide

2 Put (✓) or (✗) in front of each sentence:

1. Plants make their own food and use the energy from the food to grow. ( )
2. Seeds can germinate in and out of the soil. ( )
3. Plants release oxygen as a waste product during the photosynthesis process. ( )
4. Sunlight is a basic need for the plant, so plants grow toward it. ( )
5. Plants and animals can make their own food by themselves. ( )

3 Complete the following sentences using words between brackets:

1. Most plants can get their nutrients from the .... (soil – air)
2. Plants use carbon dioxide, and release .... in the air. (oxygen – sugar)
3. A plant stem grows .... the source of light. (away from – toward)
4. Hydroponic system provides the plant with .... and essential elements. (air – minerals)
5. .... is a common basic need between plants and humans. (Shelter – Water)

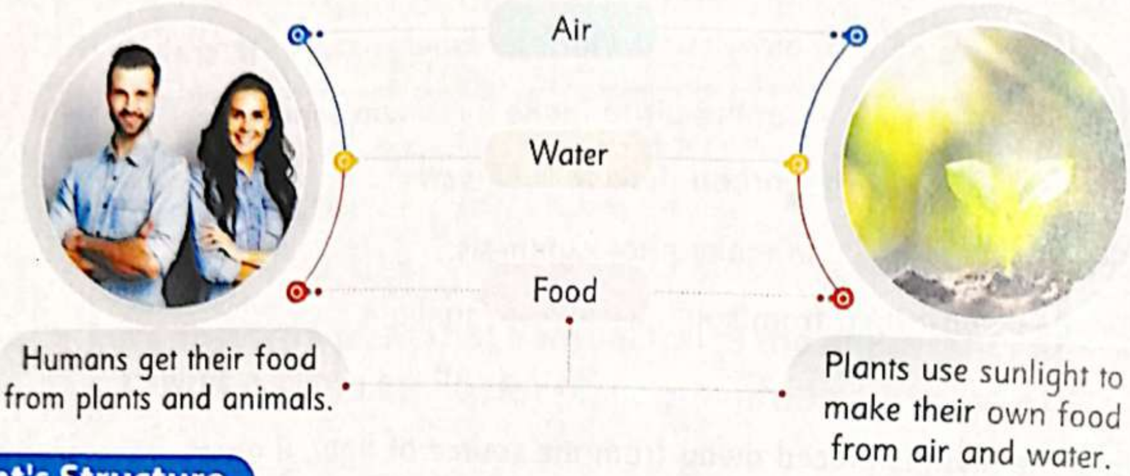






Basic Needs

- Both plants and humans have common basic needs that they must meet to survive.



Humans get their food from plants and animals.

Plants use sunlight to make their own food from air and water.

Plant's Structure

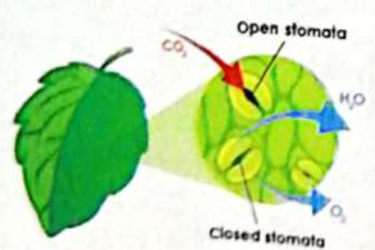
How can different plant structures help the plant survive



- The plant consists of main parts like roots, stem, leaves, and flowers that work together to survive as follows:

Leaves

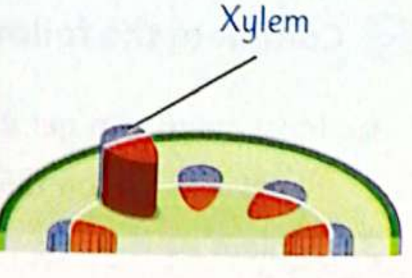
- Leaves collect sunlight.
- There are tiny openings that allow air to pass into the leaves, which are called stomata.





Stem

- Nutrients and water move up the stem through tubes called "xylem vessels".
- There are smaller vessels that connect the stem to the leaves.



Roots

- Roots absorb water and carry nutrients from the soil to the plant.

Parents' Tips
Help your child analyze how each part of the plant provides the plant with the materials it needs to grow.

Tiny openings	فتحات صغيرة
Nutrients	مغذيات



Lesson 4



- Parts of a plant are involved in the process of turning the resources into food for the plant to survive.

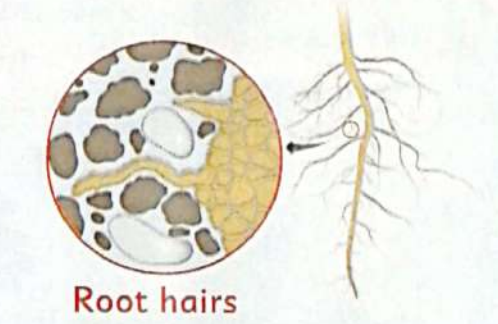
Plant Structure

- Even though all plants look different, they have similar parts.

1 Roots

Function:

1. Anchor the plant in the soil.
2. Draw water and minerals from the soil, which are needed to make food.



Root hairs

Properties:

- Plant roots have hair-like features called root hairs.
- **Root hairs' Function:** They increase the amount of water and nutrients which the plant can take from the soil.

2 Stem

Function:

1. Transports the nutrients to the rest of the plant through the stem in tubes which are called vessels.
2. Gives the plant support.



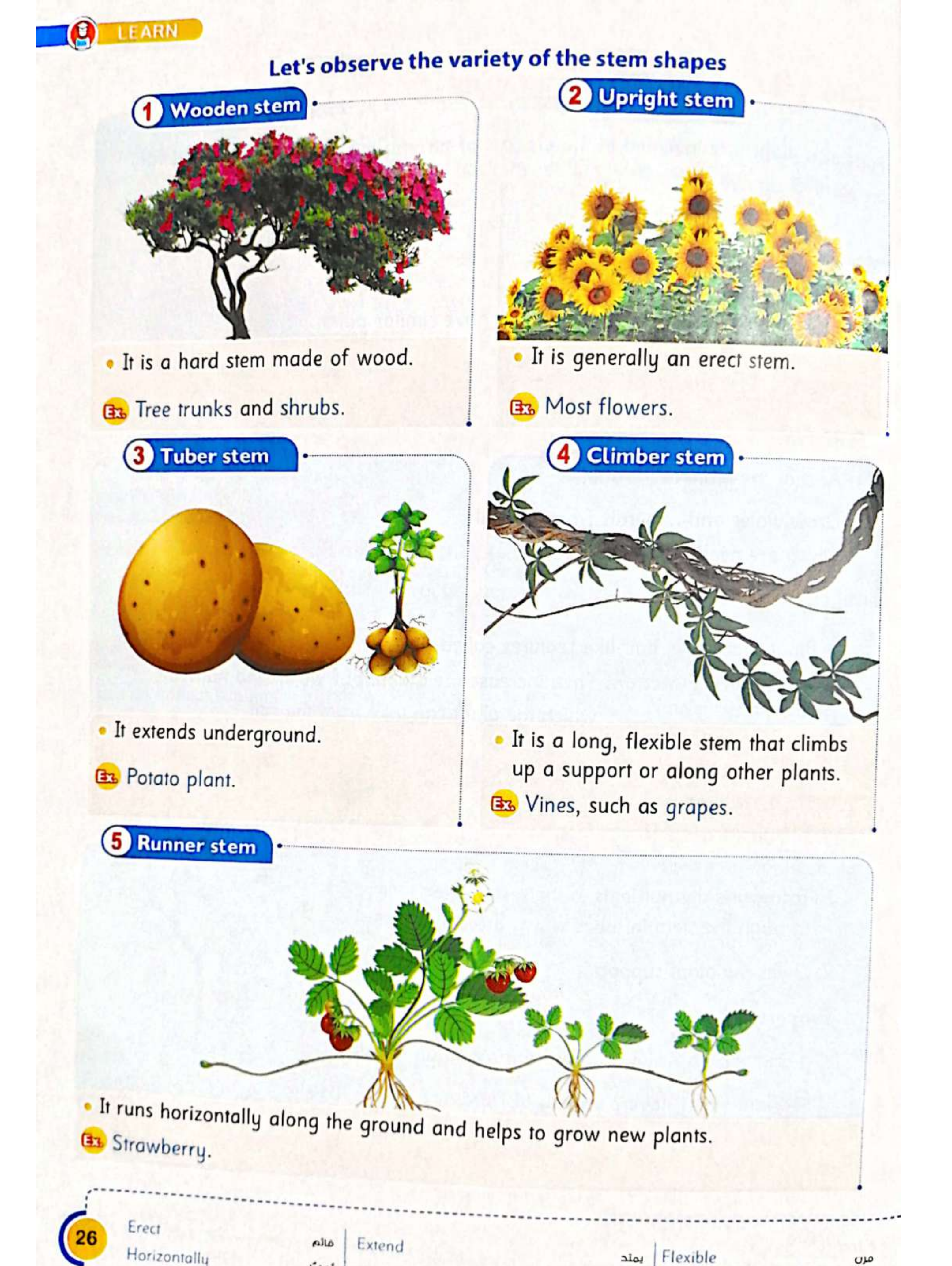
Properties:

- Flowers sometimes grow from a bud on the stem.
- Plant stems have a variety of forms.

Parents' Tips

Help your child observe the function of the plants' parts that help them take up and transport water, nutrients, and air.

Anchor	يثبت	Draw	يمتص
Variety	تنوع	Bud	برعم



LEARN

Let's observe the variety of the stem shapes

1 Wooden stem

- It is a hard stem made of wood.

Ex. Tree trunks and shrubs.

2 Upright stem

- It is generally an erect stem.

Ex. Most flowers.

3 Tuber stem

- It extends underground.

Ex. Potato plant.

4 Climber stem

- It is a long, flexible stem that climbs up a support or along other plants.

Ex. Vines, such as grapes.

5 Runner stem

- It runs horizontally along the ground and helps to grow new plants.

Ex. Strawberry.

Erect	قائم	Extend	يمتد
Horizontally	أفقيًا	Flexible	مرن



Function:

1. Make food for the plant by combining water, carbon dioxide, and sunlight through the photosynthesis process.
2. Contain a pigment called chlorophyll (which gives the leaves their green color) within structures called chloroplasts.

Properties:

- All leaves have tubes running through them called xylem, that carries water to the stem.
- There are different shapes of leaves such as:

1 Narrow and needle-like



Ex. Pine tree leaves.

2 Flat and wide



Ex. Tropical plants and banana trees.

Photosynthesis

It is the process that takes place inside the green parts of the plant (leaves) to make their own food to grow and survive.

How does the photosynthesis process occur



Chlorophyll inside the chloroplasts captures energy from sunlight.

↓

Energy from the sunlight mixes with water and carbon dioxide absorbed by the plant.

↓

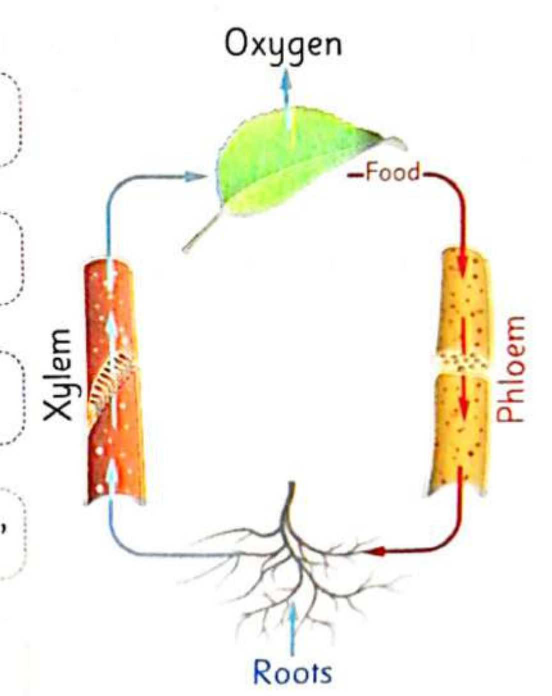
Leaves manufacture sugars, starches, and fats that the plant needs to live.

↓

Tubes are called phloem, transport the food downward, from the leaves to the other parts of the plant.

↓

Oxygen is also produced, where animals and people need to breathe.



Capture التقط | Manufacture تصنيع



Activity 10 Hands-On Investigation: Up the Stem



- (Roots - Stems) are the plant parts that soak up water and nutrients from the soil, then transport it to all the plant parts with the help of (xylem - stomata) vessels.

Caution!! Follow the lab safety guidelines while performing an experiment.

Water Transport in Plants



Aim: Transport in plants

Materials: 250 mL plastic cups – celery stalk – food coloring – water – hand lens – scissors – white carnation flowers (optional)

Steps	Illustration	Observation
1 Select a celery stalk, then record your observations about how the stalk and leaves look.		• The color of the leaves, and stalk is green.
2 Add food coloring to a cup of water.		
3 Snip about two centimeters off the bottom of the stalk, then place in the water cup for 24 hours.		
4 Cut across the celery stalk, about 5 to 7 cm up from the bottom, then record your observations about how the stalk and leaves look.		• The color of the leaves and stalk has changed to the color of the water in the cup (blue).

Conclusions

- There are tiny vascular bundles called "xylem" in the plant stem.
- These xylem vessels transfer water and nutrients from the plant roots up through the stem to its leaves and flowers.

Parents' Tips

Help your child know how plants transfer water and how transport vessels in a plant look like.

Celery stalk	ساق كرفس
Vascular tubes	أوعية النقل
Bundles	



Lesson 5



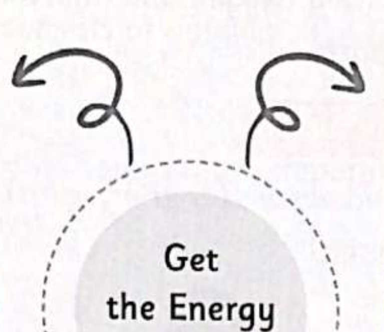
- We have previously learned that the body systems work together to keep us alive and survive.

So, the .... system is responsible for digestion and absorption of the food, while the .... system is responsible for gases exchange.

(respiratory – digestive – nervous)

Need for Energy

- Both plants and humans need energy, and gases to survive and grow.



Humans

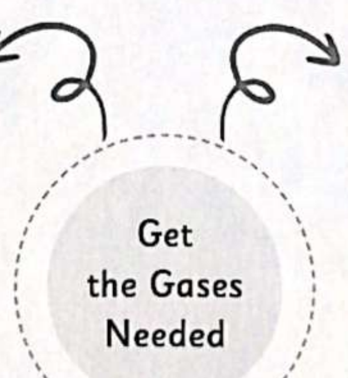
- Food is chewed and digested into glucose and nutrients by the digestive system organs, then absorbed by the blood.



Plants

- Plants use water, and carbon dioxide in the presence of sunlight to manufacture their food (energy) during photosynthesis.





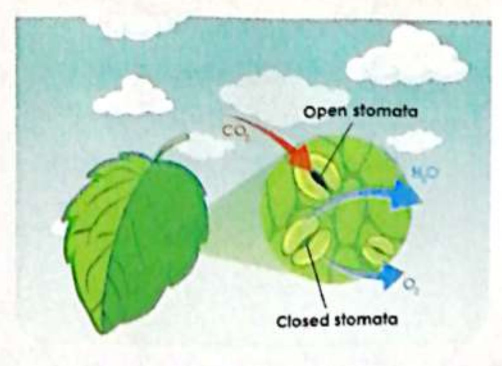
Humans

- Air enters through the nose and mouth, then to the lungs (respiratory system organs), where oxygen is transferred to the bloodstream.



Plants

- Stomata in the leaves allow air to enter the plant.



Parents' Tips

Help your child identify the similarities and differences between plant's and human's transport systems.

Bloodstream مجرى الدم

LEARN

Transport systems

Are the plant and human transport systems similar ?

Let's analyze both systems to know how they are similar

A Human Circulatory System

Circulatory System

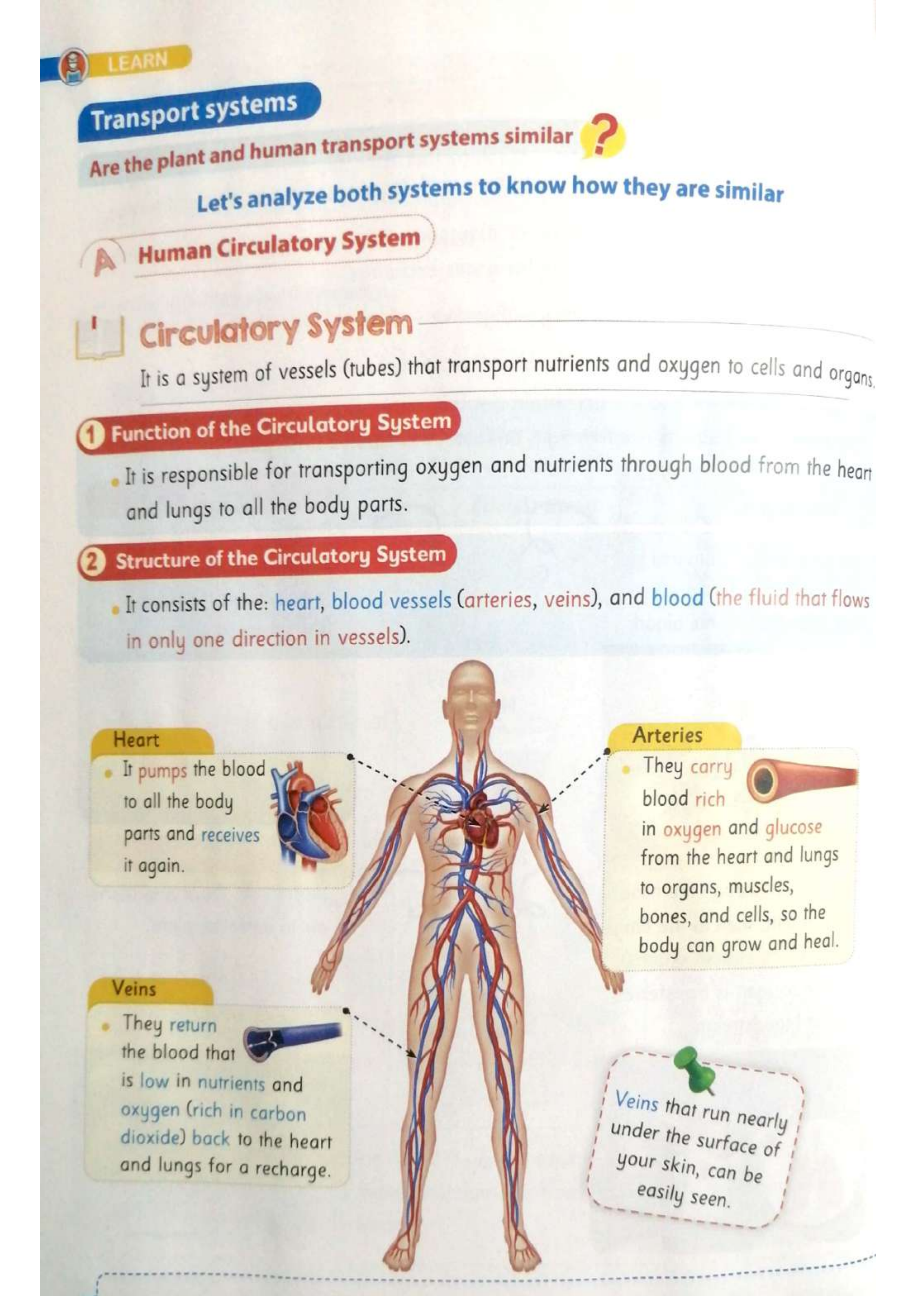
It is a system of vessels (tubes) that transport nutrients and oxygen to cells and organs.

1 Function of the Circulatory System

- It is responsible for transporting oxygen and nutrients through blood from the heart and lungs to all the body parts.

2 Structure of the Circulatory System

- It consists of the: heart, blood vessels (arteries, veins), and blood (the fluid that flows in only one direction in vessels).



Heart

- It pumps the blood to all the body parts and receives it again.

Arteries

- They carry blood rich in oxygen and glucose from the heart and lungs to organs, muscles, bones, and cells, so the body can grow and heal.

Veins

- They return the blood that is low in nutrients and oxygen (rich in carbon dioxide) back to the heart and lungs for a recharge.

Veins that run nearly under the surface of your skin, can be easily seen.

Circulatory system الجهاز الدورى	Responsible for مسؤل عن	Pump يضخ
Receive يستقبل		



B Plant Vascular System



Vascular System

It is a system of vessels (tubes) that transport plant needs throughout the plant parts for energy production to grow and heal.

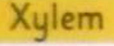
1 Function of the Vascular System

- It transports water, minerals, and sugars to and from the plant structures (roots, leaves, stems, buds, flowers, and fruits).

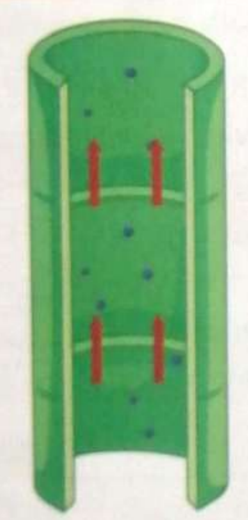
2 Structure of the Vascular System

- The plant vascular system consists of vascular bundles (xylem and phloem).

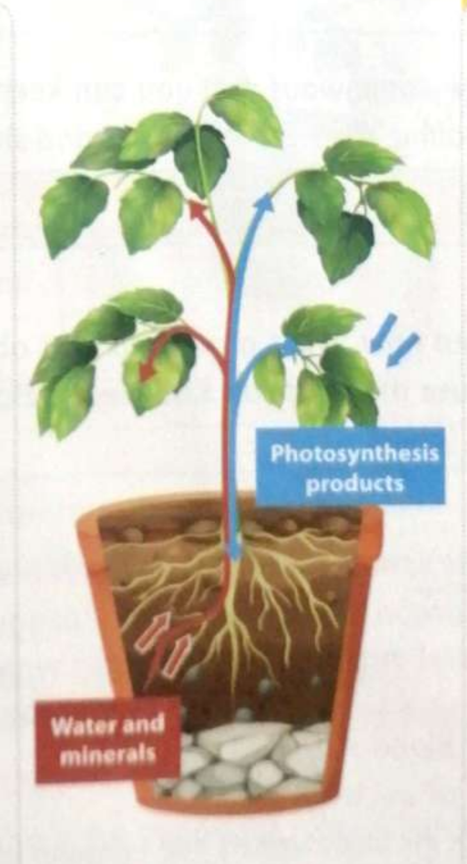
- These bundles have a specific direction to move important substances between the plant organs, like the arteries and veins.



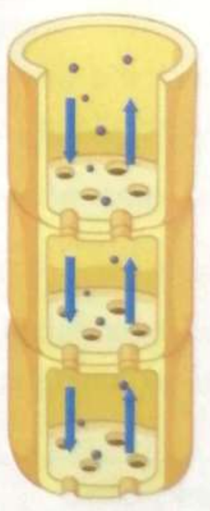
Xylem



- They are tubes that allow nutrient-rich water to travel upward from the roots to the leaves for food production and to all the plant parts.



Phloem



- They are tubes that carry the glucose (food) produced by the leaves into other growing parts of the plant, and also downward to the roots.

LEARN

Let's observe the similarities and differences between the human circulatory system and the plant vascular system

Human Circulatory System	Both	Plant Vascular System
• The human vessels transport blood to and from the heart and lungs. • Arteries carry nutrients and oxygen-rich blood. • Veins carry depleted blood back to the heart.	• Both transport life-sustaining substances. • Both have one-way tubes. • Both have vessels that transport gases and nutrients.	• The plant vessels move important substances between the plant parts. • Phloem tubes carry sugars from the leaves. • Xylem tubes carry water to leaves.

Search the internet

• Search the internet to know some ways that you can keep your heart and the rest of your circulatory system healthy, then make a poster and share it with your classmates.



Obtaining Materials

• For more knowledge about how living organisms can obtain life-sustaining materials, use the Egyptian Knowledge Bank.



Checkpoint

(A) Complete the following sentences using the given words:

(Phloem – carbon dioxide – Xylem – oxygen – sugars)

1. .... is a one-way vessel in plants that transport water and nutrients.
2. Phloem vessels transport .... produced in the leaves to all the plants parts.
3. Generally, arteries carry blood rich in ....

(B) Put (✗) or (✓) in front of each sentence:

1. The stomata have a role like the blood vessels that transport life-sustaining elements. ( )
2. The sunlight is the main source of energy for plants and all living organisms. ( )

Depleted مستنزف





Activity 13 Plant Food

- Plants could not survive without animals, and animals also.
- As plants depend on carbon dioxide released by animals, and animals depend on oxygen released by plants in the air.

Plant's Food Production

- During photosynthesis, the plant uses water, and carbon dioxide in the presence of sunlight to manufacture glucose, (plant's food), and produces waste products (oxygen and water) in the air.

What are the steps of a plant's food production during photosynthesis



1 Step

- Chlorophyll in the leaves captures light energy from sunlight.

2 Step

- Stomata in the leaves allow carbon dioxide to enter the plant.

3 Step

- Xylem vessels take in water and nutrients from the soil and transport them to other plant parts.

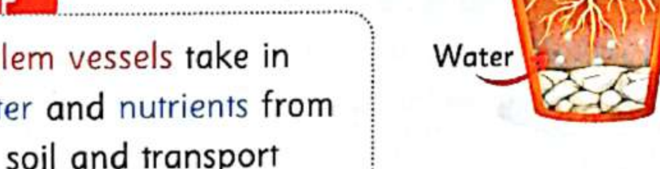


4 Step

- In the leaves, water, and carbon dioxide are mixed in the presence of sunlight to make a sugar called glucose.
- Phloem moves glucose to other plant parts as a source of energy to live and grow.

5 Step

- Plant parts use the glucose to grow, while oxygen and water vapor are released into the air; that other living organisms use it.





Note Energy can be transformed from one form to another.
So, during photosynthesis, Light energy (Sunlight) transformed into → Chemical energy (Glucose)

14 Digital Extension Activity

Leaves and Food Production

- For more knowledge about the important role of leaves in the plant's food production, use the Egyptian Knowledge Bank.



Parents' Tips
Help your child know the right order of photosynthesis steps and identify the relationships between the structure of the plant and its function at each step.



- Plants make their own food during the photosynthesis process.

The food and energy produced from this process help the plant ....

grow ☐ die ☐ heal ☐ reproduce ☐

Reproduction of Plants

- The flower is one of the parts of the plant that has specific functions.
- Flowers also have different shapes, sizes, and colors.



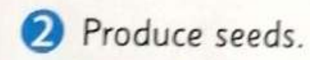
Flower

It is the reproductive part of many plants.

Plant reproduction is the process of making new plants.

Function of the Flowers

1. Help plants reproduce.
2. Produce seeds.









Sunflower

- There are small dark-colored seeds in the center of the flower.



The seed is actually a miniature plant waiting to grow, and if it receives air, water, and suitable temperature, it can grow into a new plant.

Search the internet

- Search the internet to know how plants use the food they make to reproduce, and the importance of flowers and seeds to a plant, then share your research with your classmates.

Checkpoint



Complete the following sentences:

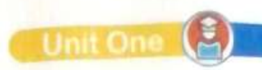
1. .... is actually a miniature plant waiting to grow.
2. Flowers are plant parts that are responsible for ....
3. .... is a reproductive part of many plants.



Parents' Tips

Help your child know how the plants use the food they make to reproduce and explain the function of flowers.





Lesson 6





- We have previously learned that a plant makes its own food, which enables it to grow and reproduce with the help of its seeds.
  But these seeds have to grow in a place that provides their needs.

Guess how this seed that has burs and hooks could move from one place to another.



- Stuck to animals' fur. ☐
- Could be eaten and excreted in another place. ☐

Methods of Seed Dispersal

- Seeds must travel away from their parent plant so that a young plant will not have to compete with an established plant for resources. This method is called seed dispersal.

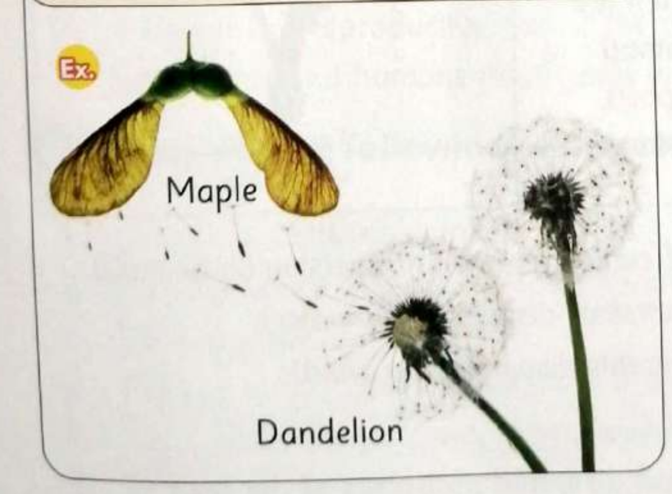
Seed Dispersal

It is how seeds are transported from one place to another.

Let's observe some dispersal methods and analyze the seed properties that best suit each method

1. Wind

- Seeds that are dispersed by wind are fluffy, light, and feathery.



2. Water

- Seeds that are dispersed by water are light and can float.



Parents' Tips

Help your child know the ways of seeds dispersal and observe the properties of seeds that suit each dispersal way.

Excreted	تم اخراجه
Established	الموجود
Seed dispersal	انتشار البذور

3. Animals and human transport

- Seeds can be dispersed by sticking to animals' fur or human clothing, have hooks, burs and could be sticky.

Ex.

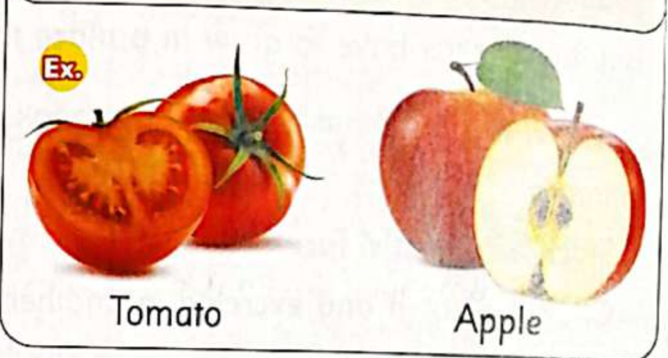


Burdock

4. Being eaten

- Seeds can be dispersed if they have good taste and could be eaten by humans and animals, then excreting them in another place.

Ex.



Tomato Apple

Let's conduct an experiment to investigate the methods of dispersal



Aim: Traveling seeds

Materials: Pan of water – fan – piece of carpet or fuzzy blanket – model building materials (clay, tissue paper, toothpicks, cotton balls, etc.)

Caution!! Follow the lab safety guidelines while performing an experiment.

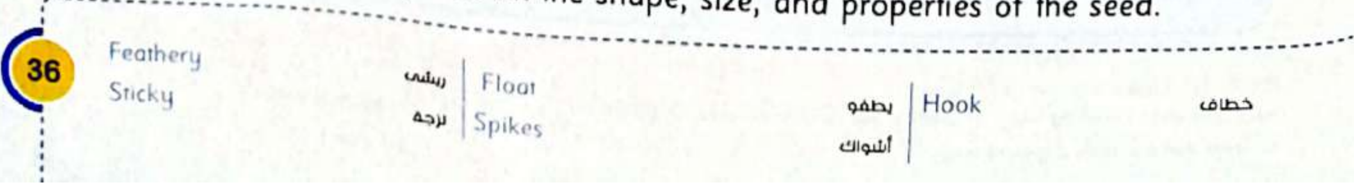
Steps	Illustration
1 Observe the properties of the seeds, then test which dispersal way suitable for each one by using a pan of water, blowing air, or a piece of carpet or fuzzy blanket.	Burdock seeds with spikes; Lotus seeds can float
2 Record your observations.	
3 Design a model of an imaginary seed, then test your model with the chosen dispersal method (It could be water, wind, or animal transport), and record your observation and conclusion.	Yang seed with wings

Observation:

- The seed with spikes holds onto the piece of carpet (represents dispersion by animals).
- The seed that floats on the water pan (represents dispersion by water).
- The seed with wings is blown by air (represents dispersion by wind).

Conclusion:

- The dispersal method depends on the shape, size, and properties of the seed.





Learn Exercise 2



1 Choose the correct answer:

1. All of the following are from the plant structures that participate in photosynthesis except ....
   a. roots
   b. leaves
   c. stem vascular bundles
   d. flowers
2. .... allow(s) air to enter the leaves.
   a. Chlorophyll
   b. Carbon dioxide
   c. Stomata
   d. Phloem
3. When we place a plant stalk in colored water, ...
   a. the stalk matches the color of the water
   b. the xylem vessels move the water up
   c. the stalk color doesn't change
   d. Both (a) and (b)
4. The best dispersal way for fluffy and light seeds is/are ....
   a. carried by moving water
   b. blowing in the wind
   c. stuck to animal fur
   d. All of the previous answers
5. All of the following parts represent the human circulatory system except ....
   a. arteries
   b. veins
   c. the heart
   d. lungs

2 Put (✓) or (✗) in front of each sentence:

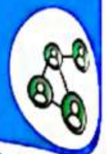
1. The blood in the human circulatory system doesn't move in a specific direction. (   )
2. Veins could be easily seen under the skin and carry blood rich in oxygen. (   )
3. The blood returns to the heart to be recharged with oxygen through veins. (   )
4. A flower is a reproductive part of the plant. (   )
5. Both plants and humans need gases to survive. (   )

3 Complete the following sentences using words between brackets:

1. .... capture(s) sunlight. (Stomata – Chlorophyll)
2. Plants produce .... through photosynthesis that is used as a source of energy for it to grow. (glucose – oxygen)
3. The .... anchors the plant in the soil. (stem – root)
4. .... stem, like potatoes, grows under the soil. (Runner – Tuber)
5. Water and nutrients are soaked up by .... vessels from the roots to all the plant parts. (phloem – xylem)



SHARE



17 Activity: Record Evidence: Tree Needs

- You have learned a lot about the plant parts, their function, and how they work together during the photosynthesis process.
- Now, you are able to write a scientific explanation, act like a scientist, and follow the scientific method:

1. Ask a question. 2. Set a claim. 3. Write evidence. 4. Explain your evidence.

- Answer the "**Question**" from the "**Can You Explain?**" activity, then share what you have learned with your classmates.

Question:

How do the structures of a plant use water, air, and light to perform life processes?

Claim:

- Plants use specialized structures to obtain their basic needs of water, air, and light.
- Each part of a plant has a function that helps it survive.

Evidence:

- In most plants, each part performs a special function:

Roots ⟶ Soak up water and nutrients from the soil.
Stem ⟶ Transfers the water up to the leaves.
Leaves ⟶ Take in air and absorb sunlight and use them to make their food "glucose".

- Sunlight is a basic need that plants do not thrive in the absence of it.

Scientific Explanation:

- If a plant does not have its basic needs met, it will not grow and may die.
- Plants use specialized structures to obtain their basic needs of water, air, and light.
- Plants do the photosynthesis process in their green parts (leaves) with the help of chlorophyll, to make their own food by combining carbon dioxide, sunlight, and water.
- Sunlight is transformed into chemical energy in the leaves.



18 Digital Extension Activity

Farmers Growing Plants: Irrigation

- For more knowledge about how farmers irrigate the soil to improve crop quality and growth, use the Egyptian Knowledge Bank.



Parents' Tips

Help your child return to the investigative phenomenon, then follow the scientific method to write a scientific explanation using evidence to support a claim.



Review: Plant Needs

- For more knowledge about plant needs, use the Egyptian Knowledge Bank.



https://study.ekb.eg/



Review: Plant Needs

Concept Main Ideas

- Air, water, and food are common basic needs between humans and plants.
  Humans → Get their food from plants and animals.
  Plants → Make their own food through the photosynthesis process.
- Plant basic needs are "Water", "Air" and "Sunlight".
- Soil is important for the plant to get the nutrients from it, but it is not one of the plant's basic needs.
- Soil can be replaced by a full hydroponic system that provides a source of minerals and other essential elements.
- The plant has many parts that help it obtain its needs from the surrounding, with many functions and properties which are:

Leaves

- Collect sunlight by chlorophyll.
- Allow air to move into the leaves through tiny openings called stomata.
- Have different shapes:
  - Narrow and needle-like leaves.
  - Flat and wide leaves.

Stem

- Gives the plant support.
- Transports water and nutrients through xylem vessels.
- Transports plant food through phloem vessels.
- Has different shapes:
  - Wooden stem.
  - Upright stem.
  - Tuber stem.
  - Climber stem.
  - Runner stem.

Roots

- Anchor the plant in the soil.
- Draw water and minerals, with the help of its hair roots that increase the water intake from the soil.

Parents' Tips
Help your child review the mentioned ideas about the plants' basic needs.



Remember Understand Apply Analyze

1 Choose the correct answer:

1. Plants use energy from sunlight to make their own food from water and carbon dioxide through a process called ....
   a. reproduction b. photosynthesis c. germination d. respiration
2. Plants use energy from .... to make their own food from water and carbon dioxide.
   a. batteries b. fire c. sunlight d. wind
3. Duckweeds are tiny, floating plants found on the top of lakes and ponds. How do they get the energy that they use as food?
   a. They use photosynthesis to change light energy into food.
   b. They are so small that they can absorb the energy they need from water.
   c. They are parasites that attach to fish to absorb the energy they need.
   d. They eat other plants.
4. Which of the following is taken in from the atmosphere through leaves to make food for a plant?
   a. Carbon dioxide. b. Glucose. c. Oxygen. d. Hydrogen.
5. When a plant stem is placed in red-colored water, the plant color ....
   a. turns red b. turns yellow c. doesn't change d. turns blue
6. Xylem vessels transport ....
   a. water b. minerals from the soil
   c. sugars d. (a) and (b)
7. Which statement is not an accurate representation of plant activity?
   a. Photosynthesis occurs in tiny structures called chloroplasts.
   b. Sugars are moved to leaves from roots through the stem.
   c. Roots carry water and nutrients from the soil to the rest of the plant.
   d. Plants use sunlight, nutrients from the soil, water, and air to make the food they need.
8. Which of the following represents photosynthesis?
   a. Carbon dioxide + sunlight + water → oxygen + sugar
   b. Carbon dioxide + sugar + water → oxygen + sunlight
   c. Oxygen + sunlight + water → carbon dioxide + sugar
   d. Carbon dioxide + oxygen + water → light + sugar





9. Photosynthesis occurs in the chloroplasts of plant cells. Which gas is released during this process?

a. Nitrogen. b. Hydrogen. c. Oxygen. d. Carbon dioxide.

10. Tamer planted a flowering plant in a pot. He used rich soil and watered it regularly. Then he placed the plant into a plastic bag and hid it for a week. He water the plant daily, but the plant did not survive.
The plant did not survive because it was not provided with .... which are the basic needs of the plant.

a. air and light
b. water and fertilizer
c. pollen and seeds
d. warmth and mulch

11. A long, dry season in a rainforest produced below-average rainfall, and some plant populations declined afterward. Why did the change in weather patterns affect plant growth in the region?

a. The dry season caused the temperature in the area to drop.
b. The dry season caused the soil to become less nutrient-rich.
c. The dry season reduced the amount of water in the ground.
d. The dry season caused less sunlight to reach the ground.

12. .... is/are the green pigment in chloroplasts that captures the energy in sunlight.

a. Chlorophyll b. Stomata c. Phloem d. Xylem

13. The .... is the most photosynthetic part of a plant.

a. trunk b. flower c. stem d. leaf

14. The .... helps to support the plant. It holds the leaves up to get sunlight to make food.

a. leaves b. stem c. seeds d. flowers

15. .... allow(s) gases exchange between a leaf and the atmosphere.

a. Roots b. Phloem c. Stomata d. Xylem

16. Root hairs are important for the plant, ...

a. as they decrease the surface area of the roots to keep in water
b. as they increase the surface area of the roots to decrease absorption
c. as they increase the surface area of the roots to increase absorption
d. No correct answer.

17. .... from the sun is changed into .... during photosynthesis.

a. Chemical energy - light energy
b. Light energy - chemical energy
c. Thermal energy - light energy
d. Electrical energy - chemical energy



18. Plants and humans depend on each other, because ....
    a. plants use the oxygen humans produce
    b. plants need someone to water them
    c. plants use the carbon dioxide humans release and turn it into oxygen
    d. plants use the glucose humans give them
19. Which part of the plant transports food from the leaves to other parts of the plant?
    a. Xylem. b. Rootlets. c. Chloroplasts. d. Phloem.
20. Which of the following indicates the pathway of water through a plant?
    a. Root hairs → Xylem → All plant's parts
    b. All plant's parts → Root hairs → Xylem
    c. Xylem → All plant's parts → Root hairs
    d. No correct answer.
21. Which part of the plant plays a similar role in keeping the plant alive to the circulatory system in humans?
    a. The stem. b. Roots. c. Leaves. d. The vascular system.
22. All of the following are the main parts of the human circulatory system, except ....
    a. the heart b. blood vessels c. the brain d. blood
23. An artery ....
    a. pumps blood to the heart
    b. pumps blood to and from the heart
    c. carries blood away from the heart
    d. carries blood low in oxygen
24. All of the following are similarities between the circulatory system in humans and vascular systems in plants, except ....
    a. both are transport systems
    b. both transport water, nutrients, and dissolved substances
    c. both don't have vessels that transport substances in specific directions
    d. All the previous answers
25. Seed dispersion helps the seed ....
    a. not germinate
    b. to move to the same place and grow
    c. to move further away from the parent plant and grow
    d. to compete with the parent plant for minerals in the soil
26. Seeds that are dispersed by humans and animals ....
    a. can float on water
    b. have bad taste
    c. have hooks or stiff hairs
    d. have wing-like structures



2 Complete the following sentences using words between brackets:

1. .... is the main source of energy for the plant. (The sun – Air)
2. .... is not considered a plant's basic need. (Air – Soil)
3. Plants use .... which is produced from the respiration of other living organisms. (oxygen – carbon dioxide)
4. One of the soil replacements is .... (greenhouse – hydroponic system)
5. The plant stores chemical energy in the form of .... (sugars – oxygen)
6. Photosynthesis occurs in the .... in the plant leaves. (chloroplast – stomata)
7. .... gives the plant its green color. (Stomata – Chlorophyll)
8. Flowers sometimes grow from .... on the stem. (buds – root hairs)
9. Vines extend their stem to hand on other trees or supporting objects, so they have a .... stem. (tuber – climber)
10. Strawberry has a .... stem. (runner – climber)
11. Stomata allow air rich in .... to be released from leaves. (oxygen – carbon dioxide)
12. The plant vascular bundle is like the .... in the human. (blood vessels – muscles)
13. .... has one way similar to the specific direction of arteries and veins. (Xylem – Phloem)
14. .... transports sugars, starch, and fats produced in the leaves to all the plant parts. (Xylem – Phloem)
15. .... transports substances upward only in the plant. (Xylem – Phloem)
16. .... pumps blood in the human body. (Heart – Kidneys)
17. Veins carry blood .... in oxygen. (rich – low)
18. .... transport blood to the heart. (Arteries – Veins)
19. Seeds with a sweet taste, like seeds on the strawberry, are best dispersed by .... (wind – being eaten)
20. Fluffy seeds, like kapok tree seeds, can be dispersed by .... (wind – being eaten)

3 Put (✓) or (✗) in front of each sentence:

1. Suitable temperature is one of the plant's basic needs. (   )
2. Seeds don't need water to germinate. (   )
3. Plants can thrive without soil. (   )
4. Animals can make their own food by themselves like plants. (   )

5. Both plants and humans need gases to survive. ( )
6. Stomata allow water to enter leaves to make photosynthesis. ( )
7. Plants produce oxygen, which other living organisms use to breathe. ( )
8. Sunlight is the main source of energy for the plant to make photosynthesis. ( )
9. Sunlight allows plants to grow weak, with pale leaves, and short stems. ( )
10. Stomata in the plant leaves act as the respiratory system in humans. ( )
11. If the plant has no chlorophyll, it can't make its own food. ( )
12. Root hairs increase the amount of water absorbed by roots. ( )
13. Sunflowers have runner stems. ( )
14. Tuber stem grows up on the surface of soil like sweet potatoes. ( )
15. Water and minerals move from up to down through the xylem vessels. ( )
16. Phloem vessels transport the food produced from leaves to all the plant parts. ( )
17. During photosynthesis process, chemical energy is transformed into light energy. ( )
18. Veins carry blood rich in carbon dioxide and low in oxygen to the heart. ( )
19. Both the plant vascular system and the human circulatory system are transport systems. ( )
20. Burdock seed has hooks that enable it to disperse by wind blowing. ( )
21. Flowers play an important role in plant survival and continuity. ( )

4 Write the scientific term for each of the following:

1. The source of energy for the plant to make photosynthesis. (..........)
2. The process that takes place inside the green parts of the plant (leaves) to make their own food to grow and survive. (..........)
3. A replacement system for the soil that provides the plant with nutrients and the essential elements. (..........)
4. The green pigment in the plant that soaks up sunlight. (..........)
5. Plant structures that allow gases to get in and out of leaves. (..........)
6. Plant structures that anchor the plant in the soil. (..........)
7. The stem type of strawberry. (..........)
8. Sweet potatoes are like potatoes; they have the same type of stem. (..........)
9. Blood vessels that transport the blood from the heart to all the body parts. (..........)

10. A one-way plant vessel similar to the specific direction of arteries and veins. (..............................)
11. The system which is responsible for transporting oxygen and nutrients throughout the body. (..............................)
12. An organ that pumps blood throughout the body. (..............................)
13. A miniature plant waiting to grow. (..............................)
14. An organ in the plant that is responsible for reproduction. (..............................)
15. A way that is used to disperse fluffy seeds like kapok tree seeds. (..............................)

5 Look at the following figures, then answer:

(A) Write the letter that suits each sentence.

1. Photosynthesis process takes place in (...............)
2. (...............) absorb water and nutrients.
3. (...............) captures sunlight.
4. (...............) is the reproductive plant structure.
5. (...............) gives the plant support.

a
b
c
d
e

(B) Your observation after one week is ....,

1. Plant (A) dies, while Plant (B) lives.
2. Plant (A) lives, Plant (B) dies.
3. Plant (A) is stronger and grows healthy than Plant (B).

Plant A

A plant in the sunlight

Plant B

A plant kept inside a closed box

(C) Light is a plant's basic need, so plants grow toward it.

Draw a circle for each one, that represents the sun that suits its growth direction.

(A) (B) (C)



(D) 1. Write down the color of each flower after leaving them in the colored water for a few days.

a. ....

b. ....

c. ....

a b c

2. We can conclude that the .... (xylem – phloem) vessels transport water .... (upward – in all directions)

6 Answer the following questions:

(A) List what plant needs to make photosynthesis.

1. .... 2. .... 3. ....

(B) Soil is not a plant's basic need, but plants still need minerals and essential elements that are provided by the soil.

- How could the soil be replaced?

....

(C) Write the common basic needs between plants and humans.

....

(D) Plants and humans both need gases to survive.

....

- Explain how different the taken-in gases are.

....

(E) Plants have a green color, this green structure plays an important role in photosynthesis.

- This green structure is called

....

- Its function:

....

(F) Xylem plays an important role in obtaining life-sustaining elements.

- What will happen to the plant if there are no xylem vessels?

....

(G) How could the flowers and seeds be important for the plant's survival?

....

(H) Arteries and veins both have specific functions. Compare them concerning the type of gas that each one carries.

....



1 Choose the correct answer:

1. All of the following are from the plant parts, except ....
   a. the flower b. leaves c. roots d. veins
2. Plant absorbs .... from the soil to make their own food.
   a. oxygen b. minerals c. water d. (b) and (c)
3. Veins carry blood low in ....
   a. oxygen b. carbon dioxide
   c. water d. All the previous answers
4. Vines have a/an .... stem.
   a. runner b. climber c. woody d. upright
5. Flowers are important for the plant, as they ....
   a. produce seeds b. are the reproductive organs
   c. absorb water d. (a) and (b)

2 (A) Complete the following sentences using words between brackets:

1. .... anchors the plant in the soil. (The root – The stem)
2. Arteries carry blood rich in .... (oxygen – carbon dioxide)
3. A plant stem grows .... the source of light. (away from – toward)

(B) Put (✓) or (✗) in front of each sentence:

1. Plants use the sugars they make to grow and heal. ( )
2. The blood direction within the veins is similar to the water flow within the plant's xylem vessels. ( )

3 (A) Write the scientific term for each of the following:

1. The process where plants can make their own food by themselves. (..........................)
2. A replacement system for plants that provides them with nutrients instead of the soil. (..........................)
3. The stem type of shrubs. (..........................)

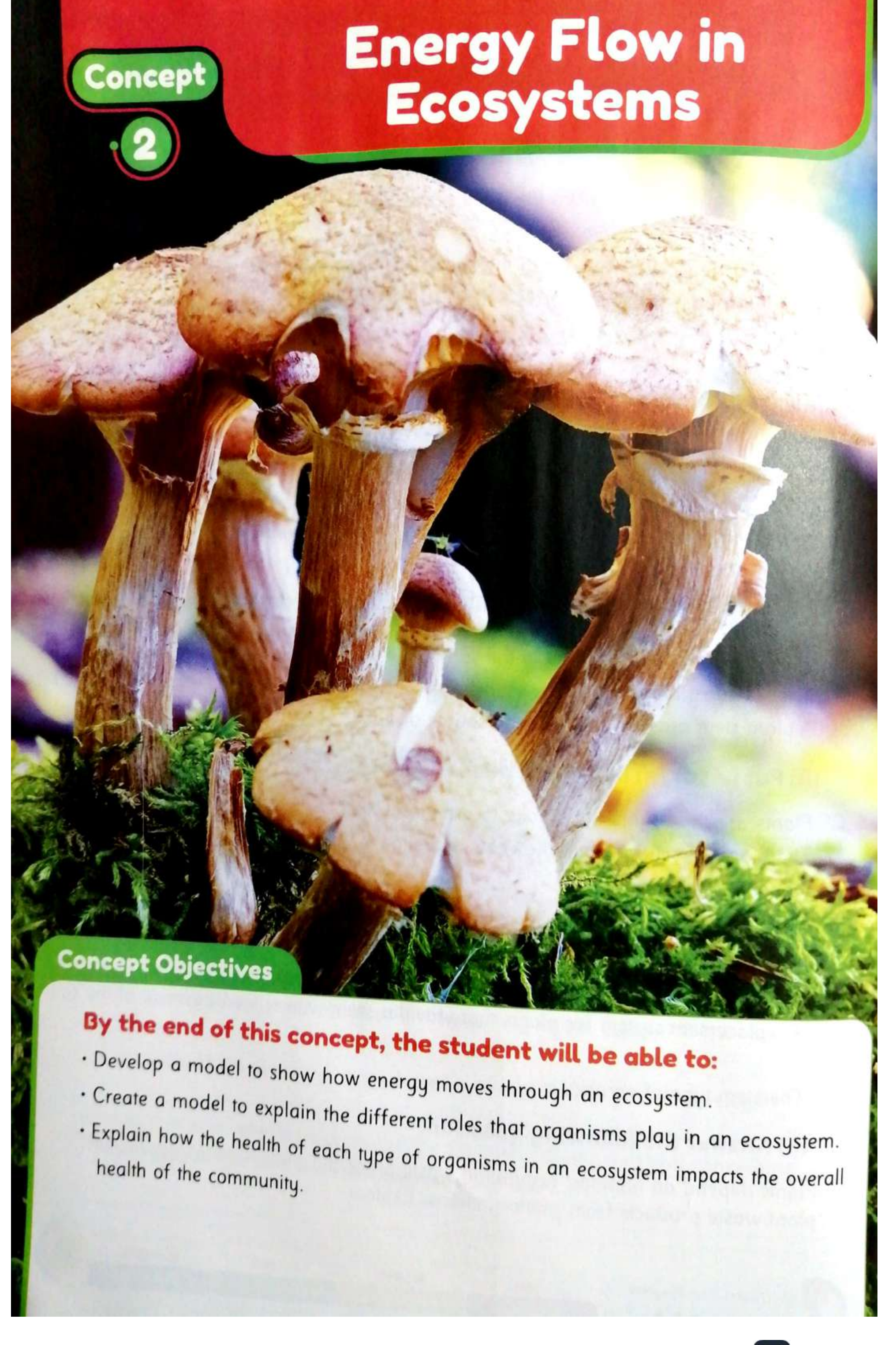
(B) Answer the following question:

- Plants depend on humans' respiration waste products, while humans depend on plant waste products from photosynthesis. Explain.

....

Assess Your Progress ★★★★★

< 50%	50 : 64%	65 : 84%	85 : 100%
Study again	Practice more	Solve more exams	Well done!



Concept 2

Energy Flow in Ecosystems

Concept Objectives

By the end of this concept, the student will be able to:

- Develop a model to show how energy moves through an ecosystem.
- Create a model to explain the different roles that organisms play in an ecosystem.
- Explain how the health of each type of organisms in an ecosystem impacts the overall health of the community.




WONDER



Lesson 1



Can You Explain?

- We have previously learned that an "Ecosystem" is a community of living organisms, and non-living things.
- Animals, plants and even humans are all parts of an ecosystem.

Energy in Ecosystems

- In all ecosystems, energy begins with the Sun, as the main source of energy.

1



Plants get energy by using radiant energy (sunlight), to make their own food (chemical energy).

2



Animals get energy by eating plants (chemical energy).

3



Animals get energy by eating other animals (chemical energy).

4



When plants and animals die, they decay and their energy recycles back to the soil (chemical energy).

How does energy flow through an ecosystem



- In this concept, we will learn how all organisms on Earth interact with each other.
- And how when all living things die, their energy returns to the soil.

Parents' Tips

Help your child remember what an ecosystem means and that the Sun is the main source of energy.

Ecosystem	نظام بيئى
Decay	يتحلل
Recycle	اعادة تدوير







Activity 2 How Hawks Get Energy

- The basis for many biological processes in ecosystem, is the interaction between animals and the environment.

Investigative Phenomenon

What Must a Hawk Do to Survive?

What does it get from food?

Hawk gets energy from food.

What does it eat?

Hawk mainly eats snakes, mice, fish, birds, squirrels, rabbits, and other small ground animals.

Does it rely on energy from plants in any way?

Hawk does not eat plants, but it eats animals that eat plants, so it also relies on plants for energy.

Osprey
(Sea hawk)

Does anything eat the hawk?

Hawk is at the top of the biological process in its ecosystem, yet it has few predators, such as eagles or other hawks.

What happens when the hawk dies?

When the hawk dies, it decays and its energy is recycled back into the soil.

Challenge

- Draw a model of how a hawk interacts with the environment.



3 Digital Extension Activity

All Animals need food to survive

- For more knowledge about animals' need for food to survive, use the Egyptian Knowledge Bank.



https://study.ekb.eg/

4 Digital Extension Activity

Decay

- For more knowledge about how energy is recycled back into the soil, use the Egyptian Knowledge Bank.

Parents' Tips

Discuss with your child how animals and environment interact with each other, using the Osprey (hawk) as an example.

Hawk	صقر
Squirrels	سنجاب
Predators	كائن مفترس





5 Activity: What do You Already Know about Energy Flow in Ecosystems?

- We have previously learned that an ecosystem contains living (biotic) and non-living (abiotic) factors.
- A healthy ecosystem sustains the life of all living members by providing their basic needs "Food, Water and Shelter".

What do Animals Eat?

- Animals eat plants and/or animals in their ecosystem, in order to get energy, as they cannot make their own food (like plants).

Examples:

1. Rabbit → Eats → Grass
2. Caracal → Eats → Rodents

(Rodents such as, rabbits, mice, rats, squirrels and hamsters).

3. Bird → Eats → Worms

Parents' Tips

Help your child by giving him/her some examples of animals and different types of food they eat.

Biotic	كائن حى
Abiotic	شئ غير حى
Rodents	قوارض

- Animals do not choose what to eat based on taste preferences, but on what their body needs to survive.
- They are also grouped according to the type of food they eat.

Ecosystems

- Typical ecosystems would contain many kinds of life-forms such as:

Examples:

Ocean


Desert


Rainforest


Tundra





Checkpoint

Put (✓) or (✗) in front of each sentence:

1. Animals eat plants only. (   )
2. When plants and animals die, their energy is recycled back into the soil. (   )
3. Ecosystem has similar life forms. (   )
4. Animals choose what to eat based on what their body needs to survive. (   )



LEARN



6 Activity Food is Energy

- What happens when you do not eat healthy food or do not eat?

  I will feel healthy. ☐ I will feel sick (or weak). ☐

- We have previously learned that "Energy" is the ability to do work.

Food is Energy

How do we Get Energy

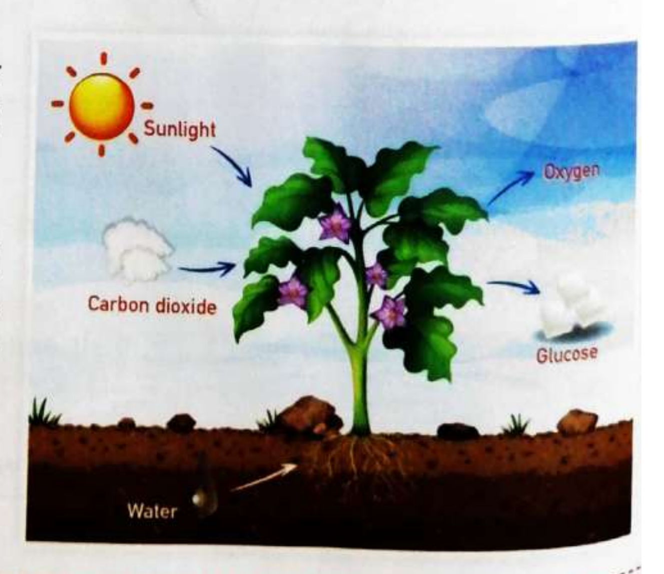


- The oxygen we breathe and the food we eat provide us with the energy we need throughout the day.
- We use this Energy to think, breathe, move, and even during sleeping.
- Some activities require a lot of energy, such as physical activities (Ex. Exercising).



Primary Source of Energy

- Sun is the primary source of energy for all organisms on Earth to live, grow, and carry out life processes.
- "Photosynthesis Process" is fundamental to life on Earth, where plants absorb Sun's energy through their leaves to make their own food by converting water and carbon dioxide from the air into glucose (sugar that plants use).



Parents' Tips

Discuss with your child how the energy moves between living organisms starting from the Sun to the plants, animals, and humans.



Energy from the Environment

Living Organisms



Plants produce their own food.



Animals (Including humans) get food from other organisms.

How do animals (including humans) get energy from environment





- They eat plants as food.





- They eat other animals that eat plants.






- They eat both plants and animals.

So, this way the energy produced from the Sun passes through all life on Earth.



Checkpoint Complete the following sentences using the given words:

(radiant – own food – Plants' leaves – Abiotic)

1. .... absorb sunlight.
2. Sunlight is called .... energy.
3. .... means non-living things.
4. Plants get energy by producing its ....





Lesson 2



- We have previously learned that energy is the key that keeps organisms alive.
- Some living organisms can produce their own food, while most organisms cannot.

Energy for Life

- Most organisms need to eat to get the energy they need to survive.
- The movement of energy and nutrients through an ecosystem can be modeled using "Food chain".

Food Chain

It is a model that shows a linear set of feeding relationships and energy movement among living things within specific species.

Let's observe how energy passes through "Food chains" of organisms in an ecosystem...

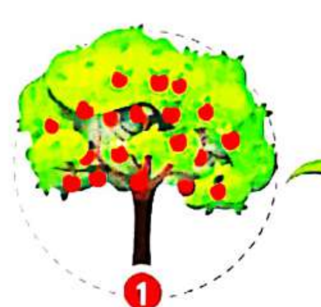
- The size of Food chain varies ...

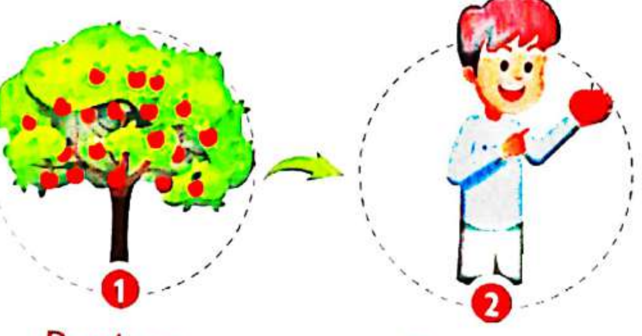


Example: Apple → Human



Sunlight
(Radiant energy passes to the plant)





1 Producers

- Are the "First-link" in a food chain.
- They are able to produce their own food in the form of energy-rich glucose.
- Almost all producers on Earth are plants.

Ex. Apple.

2 Consumers

- Are the "Second-link" in the food chain.
- They are animals/humans that eat plants. So, energy begins to move up the food chain.

Ex. Human.

3 Decomposers

- Are the "Final-link" in the food chain.
- When organisms die, decomposers recycle nutrients back into the ecosystem.

Ex. Fungi - Mold - Bacteria.

Parents' Tips

Discuss with your child that the energy moves through an ecosystem and this process can be modeled using a food chain.

Food Chain	سلسلة غذائية	Producer	منتج
Consumer	مستهلك	Decomposer	محلل



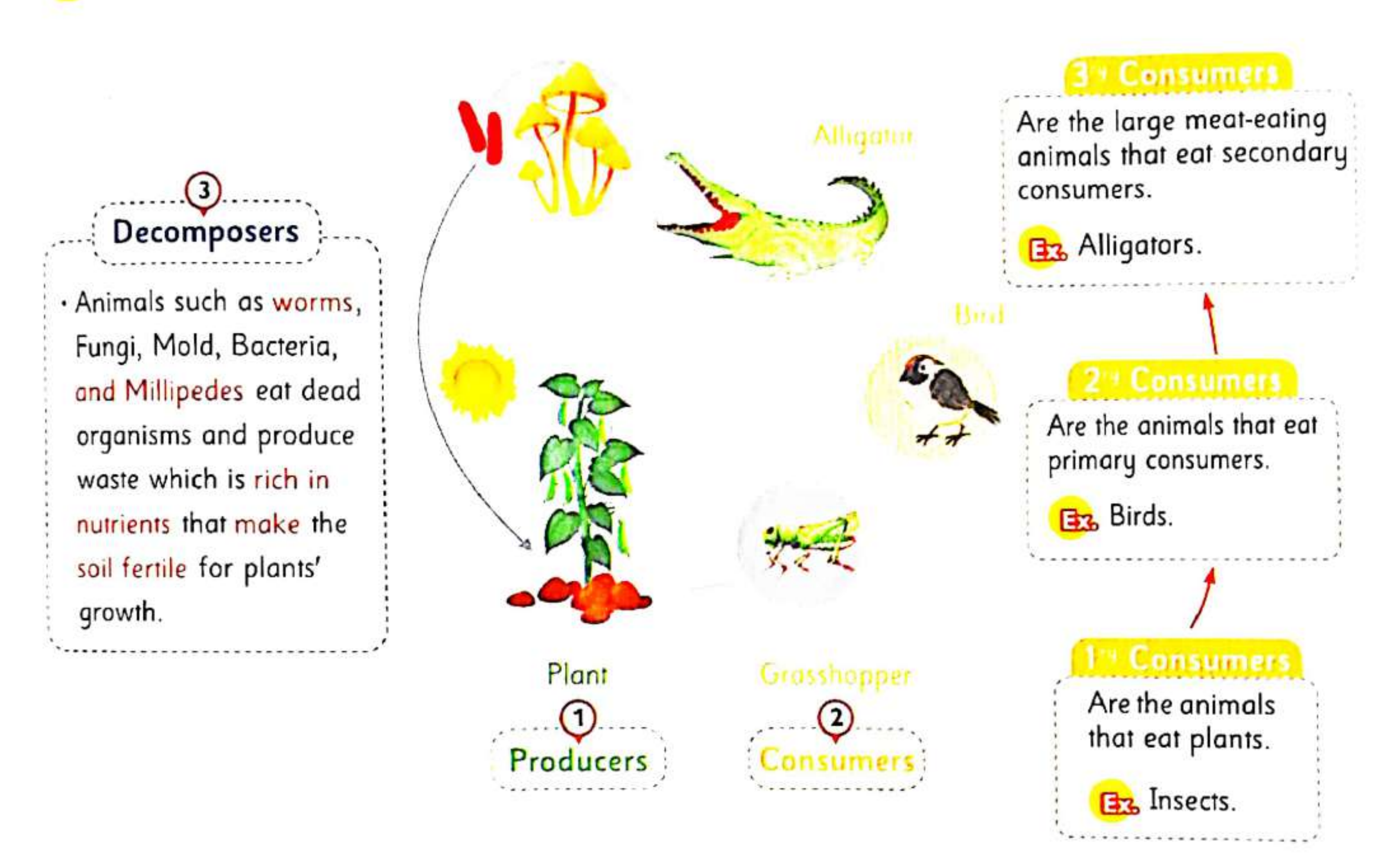
B Much longer

- In longer chains, consumers are classified into more than one level:

Primary Consumer: Those that eat producers.

Secondary and Tertiary Consumers: Those that eat other animals further up the food chain.

Example: Plant → Grasshopper → Bird → Alligator



Producers

Are the organisms that are able to produce their own food.

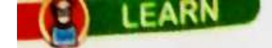
Consumers

Are the organisms that cannot produce their own food but they must eat other living organisms to get energy.

Decomposers

Are the organisms that carry out the process of decomposition by breaking down dead or decaying organisms (organic materials) into simpler substances (nutrients).

Fungi	الفطريات	Mold	عفن
Bacteria	بكتيريا	Millipedes	الديدان
Meat-eating animals	الحيوانات الآكلة للحوم		





- Do all organisms capture energy directly from the sun?

Yes ☐ No ☐

All Organisms Need Energy

- Organisms that do not obtain energy directly from the Sun, need other organisms obtain energy from.

Let's analyze how energy passes from one organism to another in an ecosyste

Examples: Grass → Mouse → Snake → Hawk

FOOD CHAIN

Energy of the Sun passes to the grass.

Sun's energy

Grass

PRODUCER

Makes its own food using sunlight.

Mouse

PRIMARY CONSUMER

Eats the grass to get energy.

Snake

SECONDARY CONSUMER

Eats the mouse

Hawk

TERTIARY CONSUMER

Eats the snake

DECOMPOSER

So, the energy of the Sun passes to the grass, then to the mouse, to the snake, to the hawk and finally to the decomposers.

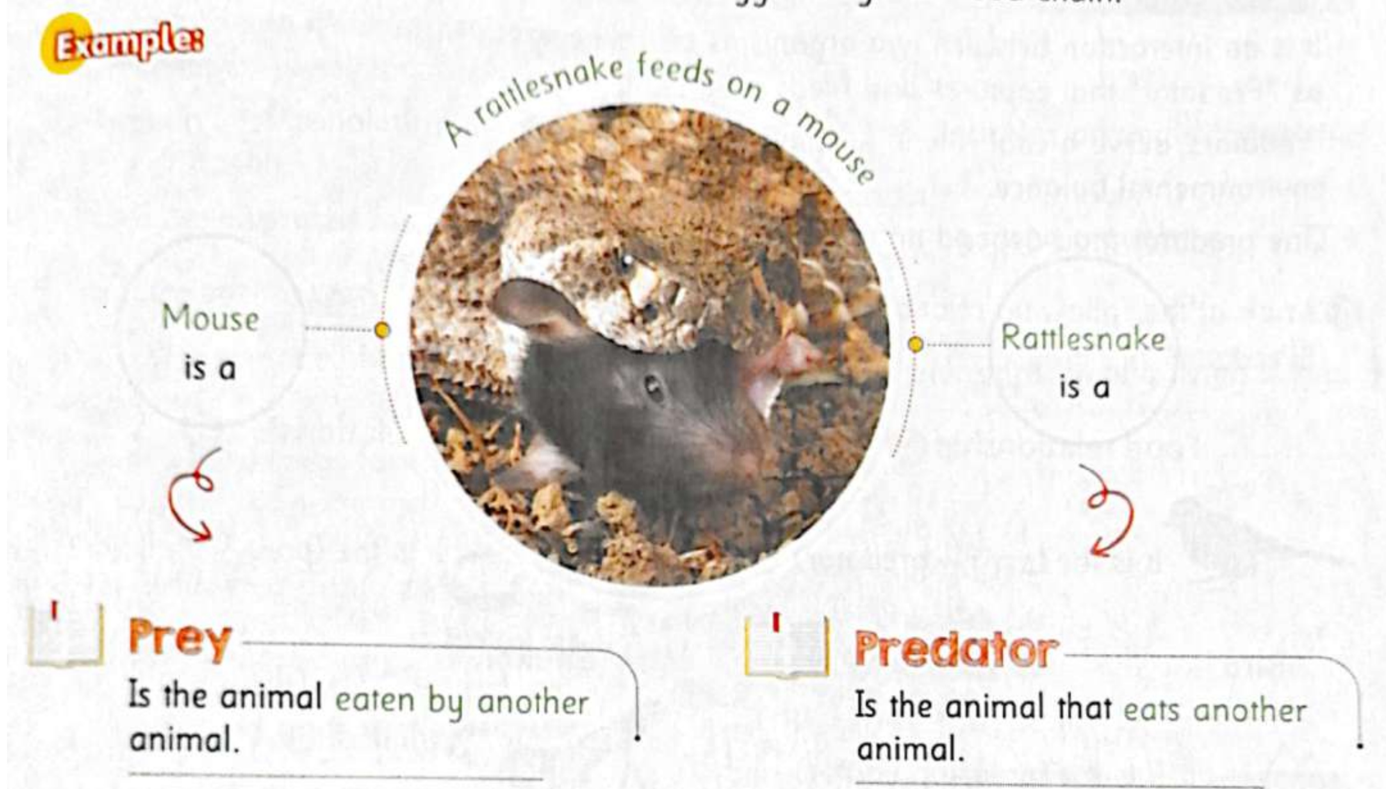
Parents' Tips

Help your child understand how organisms play an important role in the energy flow (transfer) in an ecosystem.

Predator and Prey

- As consumers eat consumers, the relationship becomes more complicated.
- Both predators and preys pass food and energy through the food chain.

Examples:



Prey
Is the animal eaten by another animal.

Predator
Is the animal that eats another animal.

What would happen if an organism was removed from an ecosystem



- If an organism was removed from a food chain, it will disrupt the energy flow in the ecosystem.

Checkpoint

(A) Write the scientific term for each of the following:

1. They are the final-link in a food chain. (..........)
2. They are the organisms that can eat plants. (..........)
3. They are the animals that can eat other animals. (..........)
4. It is the model that shows food or energy relationships among organisms within specific species. (..........)

(B) Number the food chain organisms (1-3) in the correct order:

☐ Decomposers ☐ Producers ☐ Consumers

Predator	مفترس	Prey	فريسة	Eaten by	يؤكل من قبل



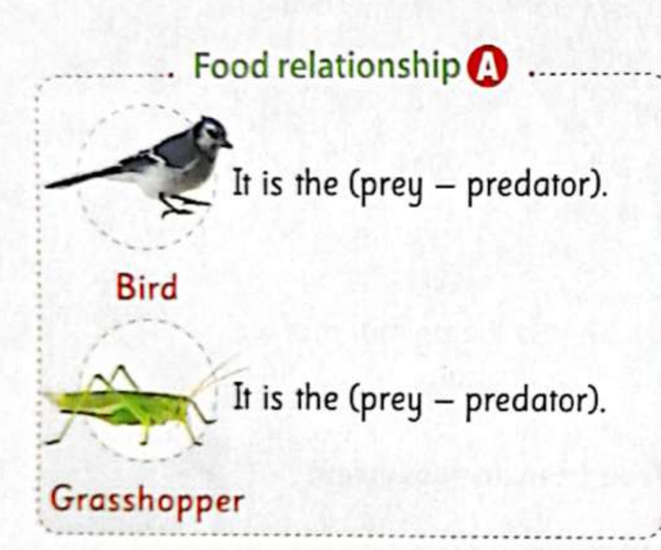
Lesson 3

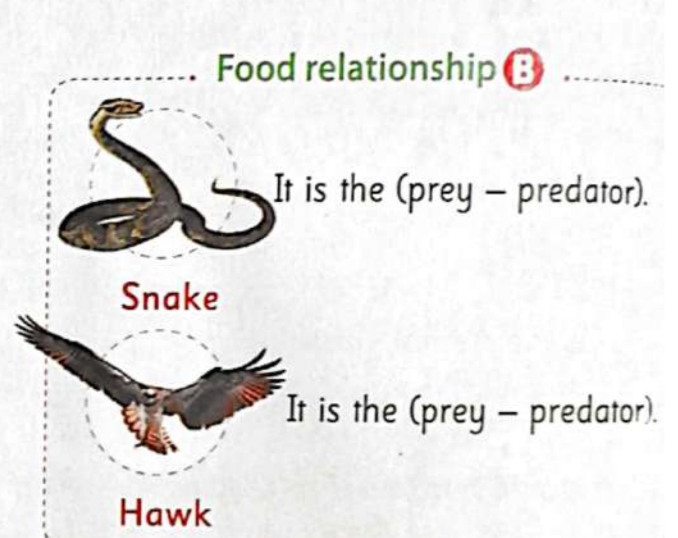


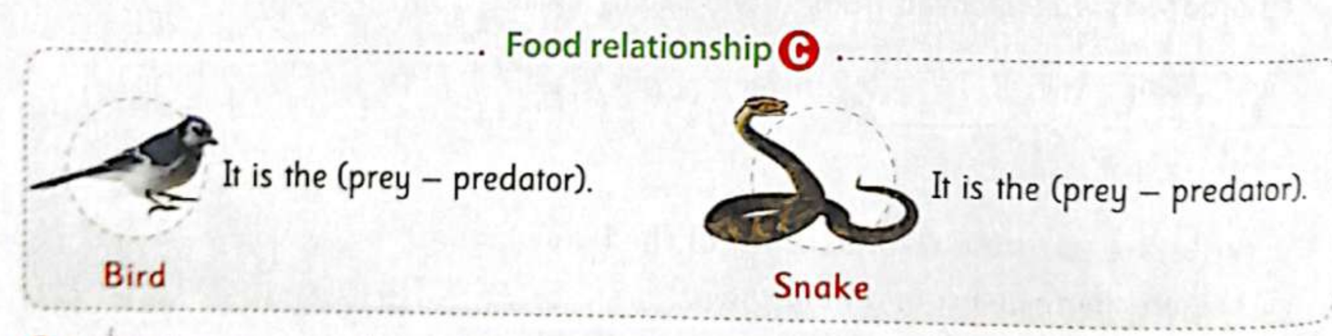
What is the Predator-Prey relationship?

- It is an interaction between two organisms of unlike species, in which one of them acts as "Predator" that captures and feeds on the other organism that serves as the "Prey".
- Predators, serve a vital role in keeping populations of prey in balance, leading to environmental balance.
- One predator may depend on many different types of organisms as prey.

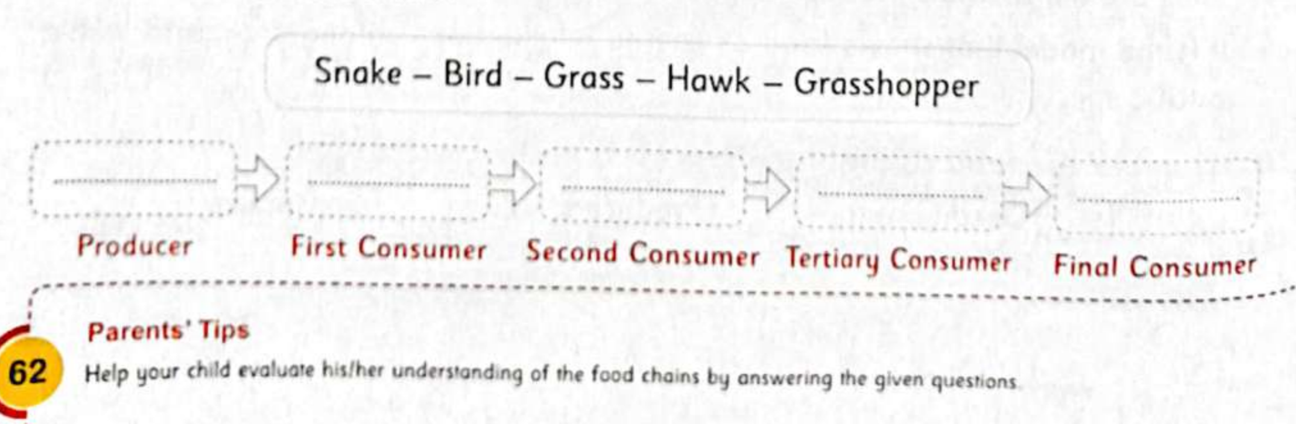
1 Look at the following relationships, then underline if each member (consumer) is a "Predator" or "Prey":







2 According to your above choices, write the names of these organisms in the correct order to make a food chain:



Parents' Tips

Help your child evaluate his/her understanding of the food chains by answering the given questions.



10 Activity Food Webs

- We have previously learned that food chain shows the relationships of food and energy that passes from one organism to another.

Interactions Among Organisms

- As most people draw their main idea in webs to show relationships among different bits of information.
- Webs are also used to show the feeding relationships among living organisms.



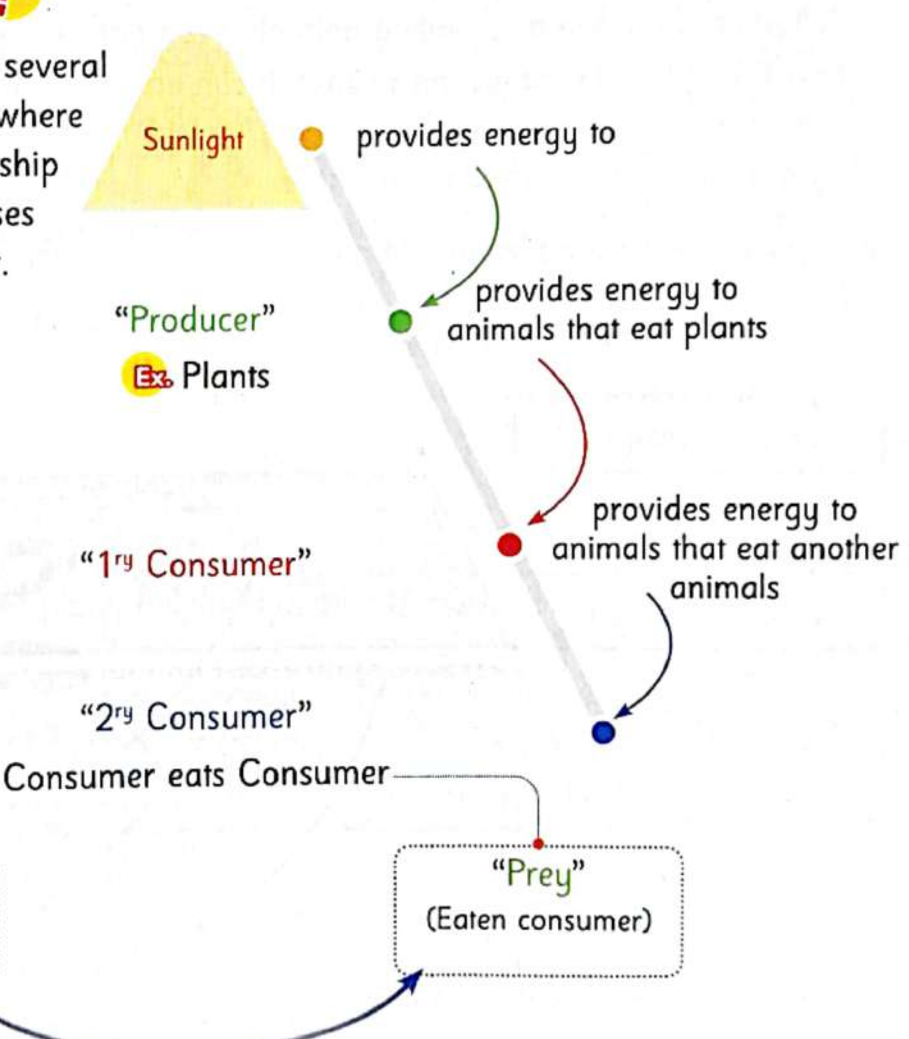
Food Web

It is a model that shows many different feeding relationships among living things.

How are food webs formed



- Food web is made up of several interconnected food chains, where food chains show the relationship of food and energy that passes from one organism to the other.
- All food chains begin with the source of energy "Sunlight".



Consumer eats Consumer

"Predator" (Consumer that eats another consumer)	"Prey" (Eaten consumer)

"Predator-Prey relation is the way many food chains intersect (interconnect) within an ecosystem forming a food web".

Parents' Tips

Help your child remember that the relationship between food and the energy passing from one organism to another can be modeled in a Food chain.

Food Web	شبكة غذائية
Intersect	تداخل



Let's list and sort the components of the food chains mentioned in the previous three activities, to create a food web...

Main Source of Energy		▸ Sunlight (radiant energy)
	Producers	▸ Grass (green plants)
Consumers	Predators	▸ Bird – Alligator – Snake – Hawk
	Preys	▸ Grasshopper – Bird – Mouse – Snake

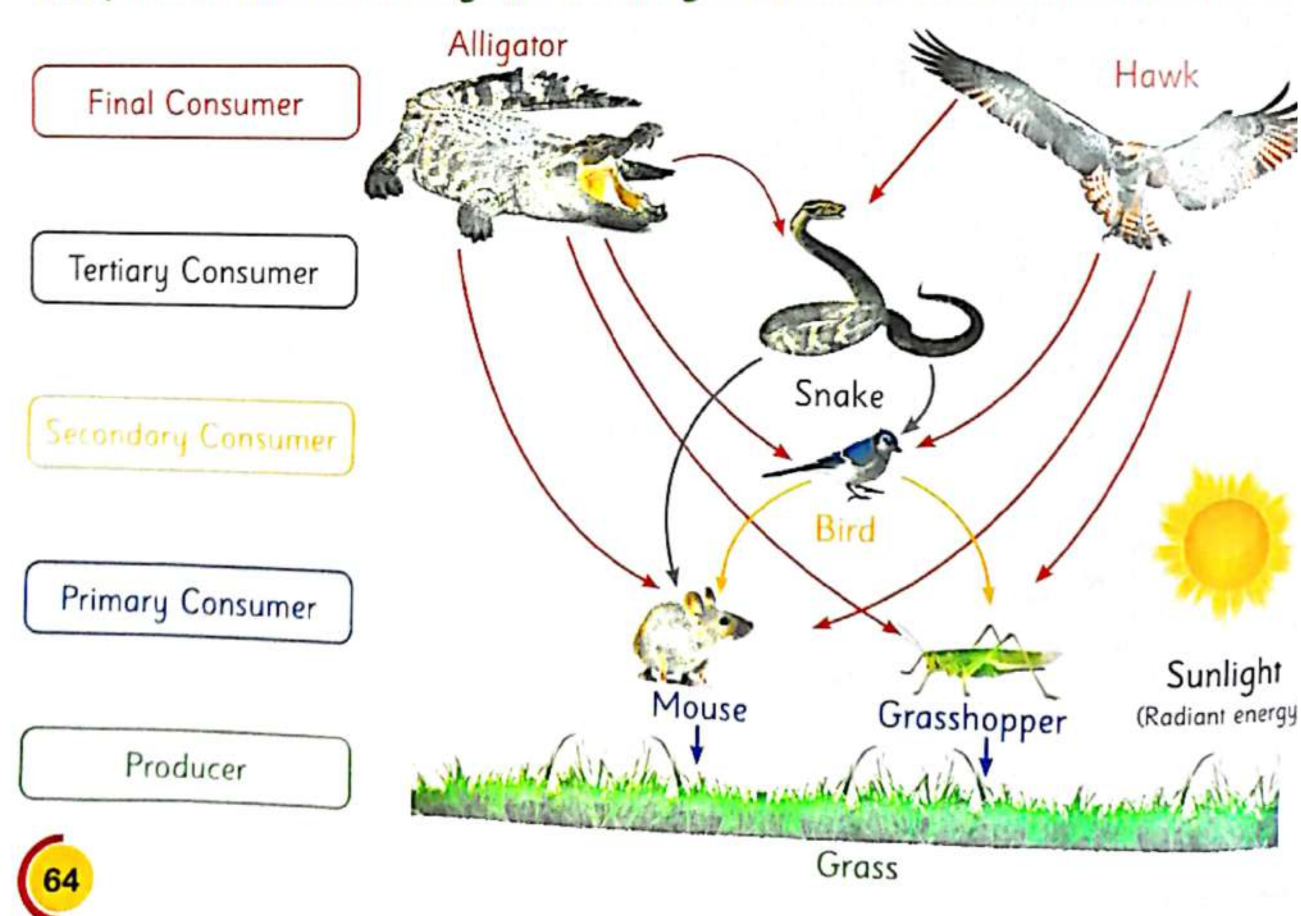
From the table above, who is eating whom 

- Grasshopper can eat Grass.
- Mouse can eat Grass.
- Bird can eat the Grasshopper – Mouse.
- Snake can eat the Bird – Mouse.
- Alligator is a large meat-eating animal; it can eat Bird – Mouse – Snake – Grasshopper
- Hawk is a large meat-eating animal; it can eat Bird – Mouse – Snake – Grasshopper.

What do arrows in a food chain show 

- They show the transfer of energy between organisms.

Now, we can model how large meat-eating animals interact in the environment.





Learn Exercise 1



1 Choose the correct answer:

1. Which organism gets energy from another organism?
   a. Water lily. b. Apple tree. c. Owl. d. Grass.
2. When a giraffe eats from an acacia tree and a lion eats the giraffe, this is an example of ....
   a. insectivore b. carnivore c. short food chain d. long food chain
3. .... is a consumer that eats another consumer.
   a. Decomposer b. 1^{ry} Consumer c. Prey d. 2^{ry} Consumer
4. A very short food chain consists of ....
   a. a producer, 2 consumers and decomposers
   b. 2 producers, 1 consumer and decomposers
   c. a producer and 2 consumers
   d. a producer, a consumer and decomposers

2 Complete the following sentences using the given words:

(consumers – Producers – secondary consumer – prey – Radiant energy)

1. In longer food chains, ... are classified into primary, secondary and tertiary consumers.
2. .... passes to the plant, helping it make its own food.
3. The consumer that eats an animal that feeds on producers is a ....
4. The eaten consumer is called ....
5. .... are the living organisms that make their own food.

3 Put (✓) or (✗) in front of each sentence:

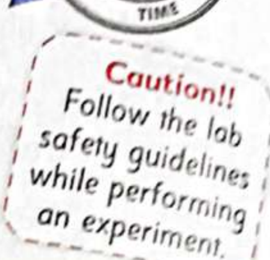
1. Grasshopper is a primary consumer. (   )
2. Food web is a linear set of feeding relationships and energy movement among living things within specific species. (   )
3. The prey is the consumer which eats another consumer. (   )



Lesson 4



11 Activity **Hands-On Investigation: Food Webs in the Neighborhood**



- Do all organisms in an ecosystem have the same feeding activity?

Yes ☐ No ☐

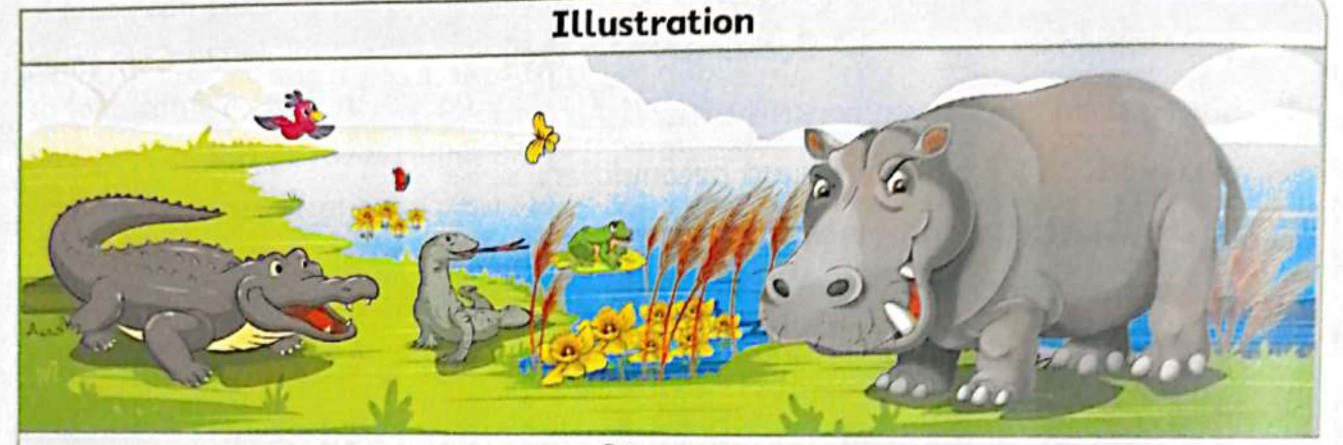
Food Webs in the Neighborhood

Caution!! Follow the lab safety guidelines while performing an experiment.



Aim: Exploring habitats and developing a food web model to describe the energy flow and feeding interactions in an ecosystem.

Illustration



Steps

1. Look at the given ecosystem.
2. Explore the habitat and classify different types of organisms that live there.
3. Pay attention and record observations to energy relationships in this environment (how each organism fits into the flow of energy through this ecosystem).
4. Record any direct feeding interactions observed.
5. Arrange the organisms in a food web (The web should include multiple organisms).

Observation:

- There are different organisms (biotic and abiotic) in the ecosystem (such as; Bladderwort, Butterflies, Reeds, Nile Hippo, Nile Toad, Bird, Nile Monitor, and crocodile.
- There are different feeding interactions between different organisms in the ecosystem (such as; Nile Hippo eats reeds, Butterfly eats Bladderwort, Nile Monitor eats Toad, ...).

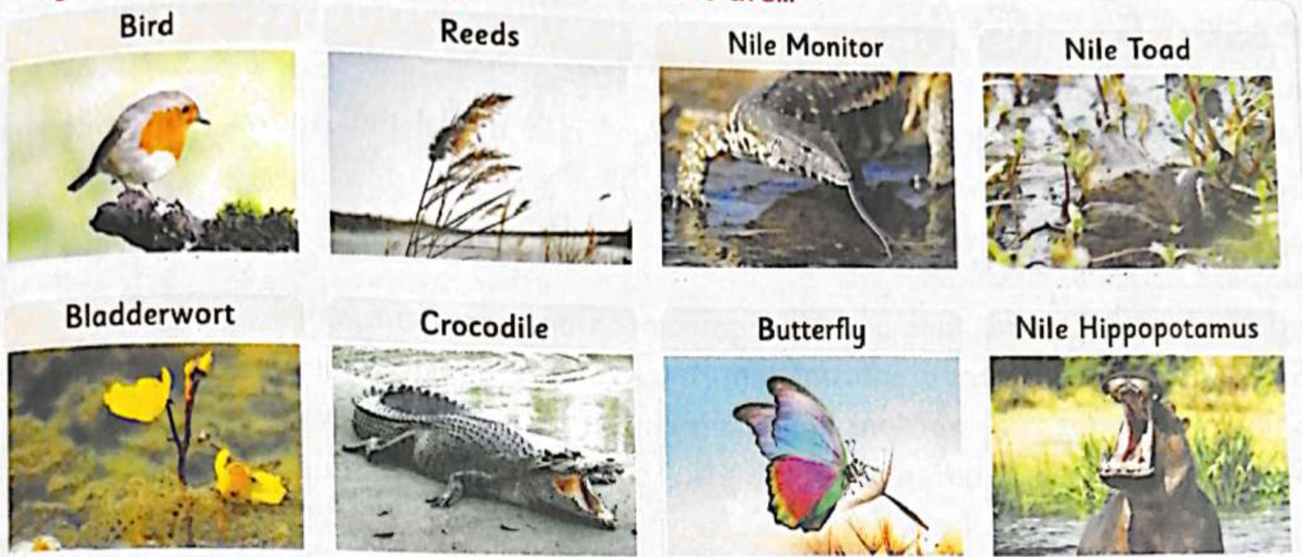
Conclusion:

- There are feeding interactions between living things that allow the energy flow in an ecosystem.

Parents' Tips

Help your child develop a food model that describes the energy flow and feeding interactions in an ecosystem.

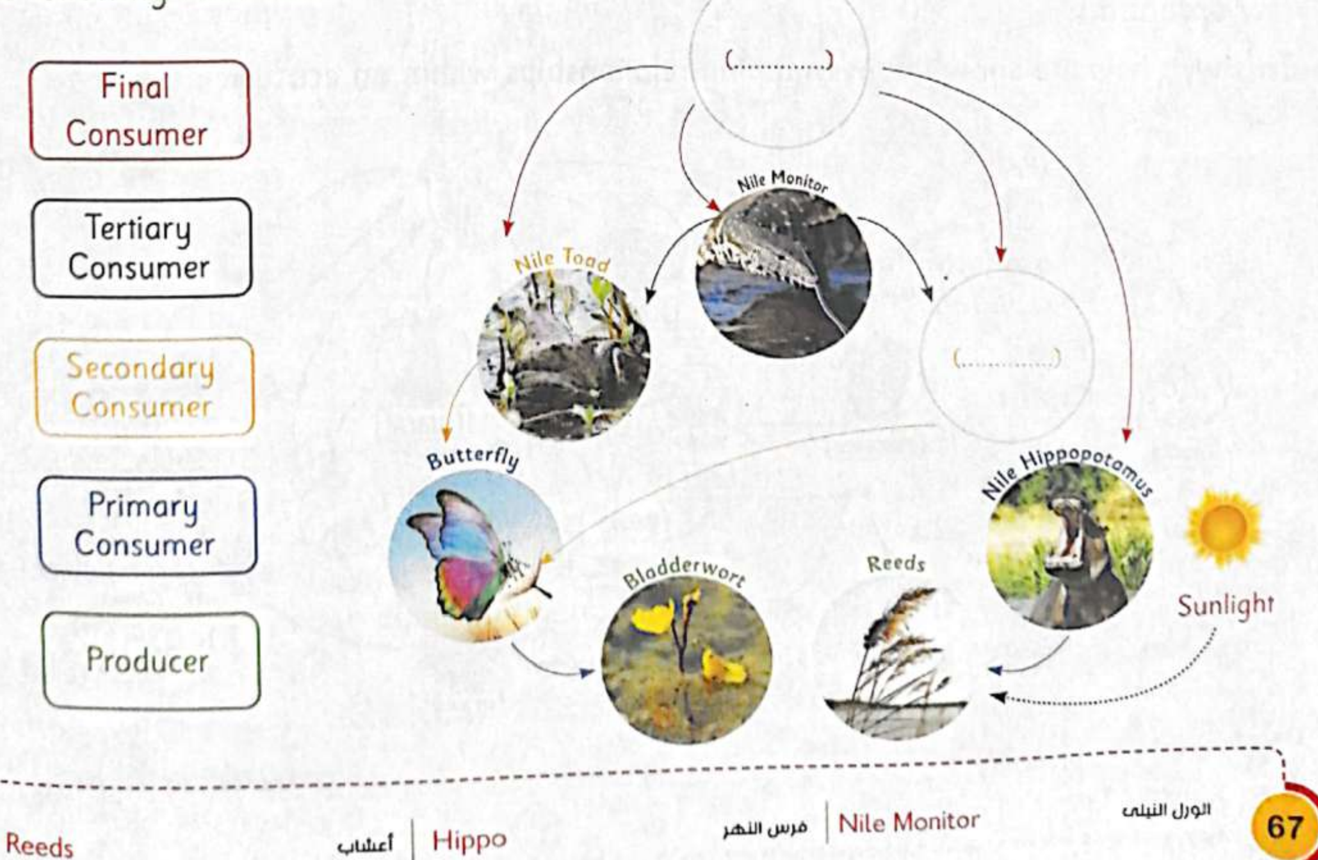
Organisms observed in the previous habitat are...



Classify the above list into "Producers", "1ry Consumers" and "2ry Consumers" and mention the feeding activity for each:

Producers		Consumers	
Name	Feeding activity	Name	Feeding activity

Now, search to find at which consumer level the Crocodile and the Bird exist to complete the following food web ...





Lesson 5



- We have previously learned that "Food Web" is a model that shows many different feeding relationships among living things.

Interactions in Food Web

Food webs model interactions among organisms in an ecosystem...

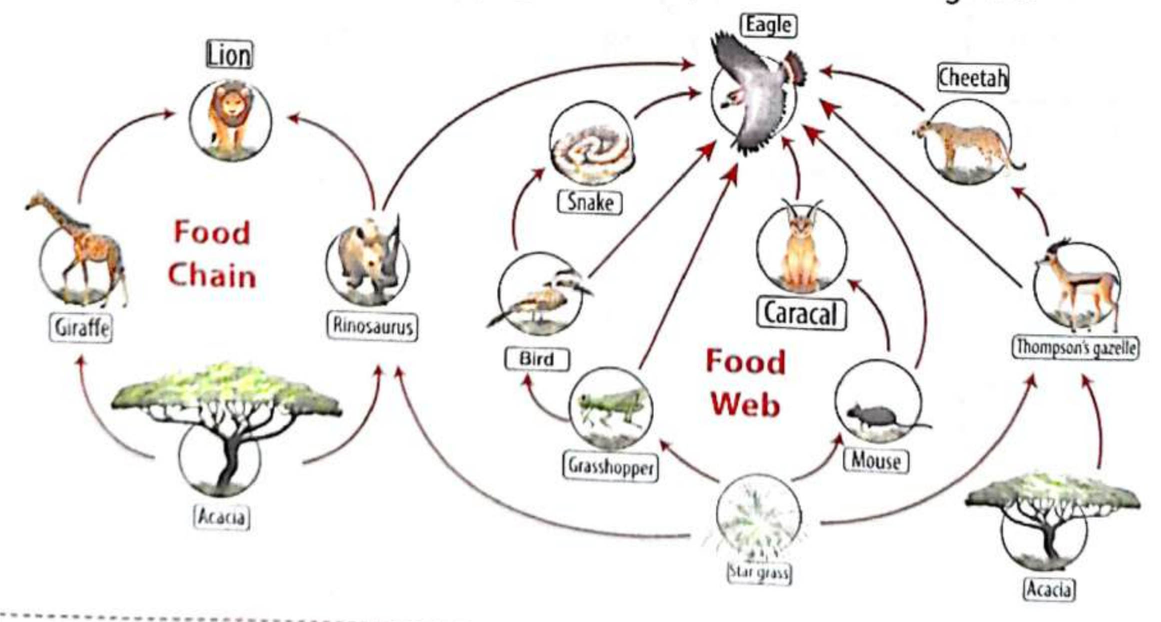
- Showing many different organisms that share food resources within an ecosystem.
- Showing how these interactions connect organisms within an environment.
- Showing how several different consumers may eat the same producer.

Food web represents a system for energy transfer...

- All organisms need energy to survive and grow.
- Producers get energy from the Sun, then they become food for consumers.
- Consumers must eat for energy, then they become food for other consumers (which also must eat producers or other consumers to obtain energy).
- It shows a variety of organisms within an ecosystem connected as "Producers" and "Consumers".
- Organisms eat as "Predator" and are eaten as "Prey" in order to obtain and pass energy.

Food web is a better choice than food chains as it shows the interactions among organisms, because...

- It shows interactions among many food chains instead of the interactions between just few organisms.
- This web helps to show the overlapping relationships within an ecosystem.



Parents' Tips

Help your child evaluate his/her understanding of the intersection between different food chains (Food webs), by answering the given questions.

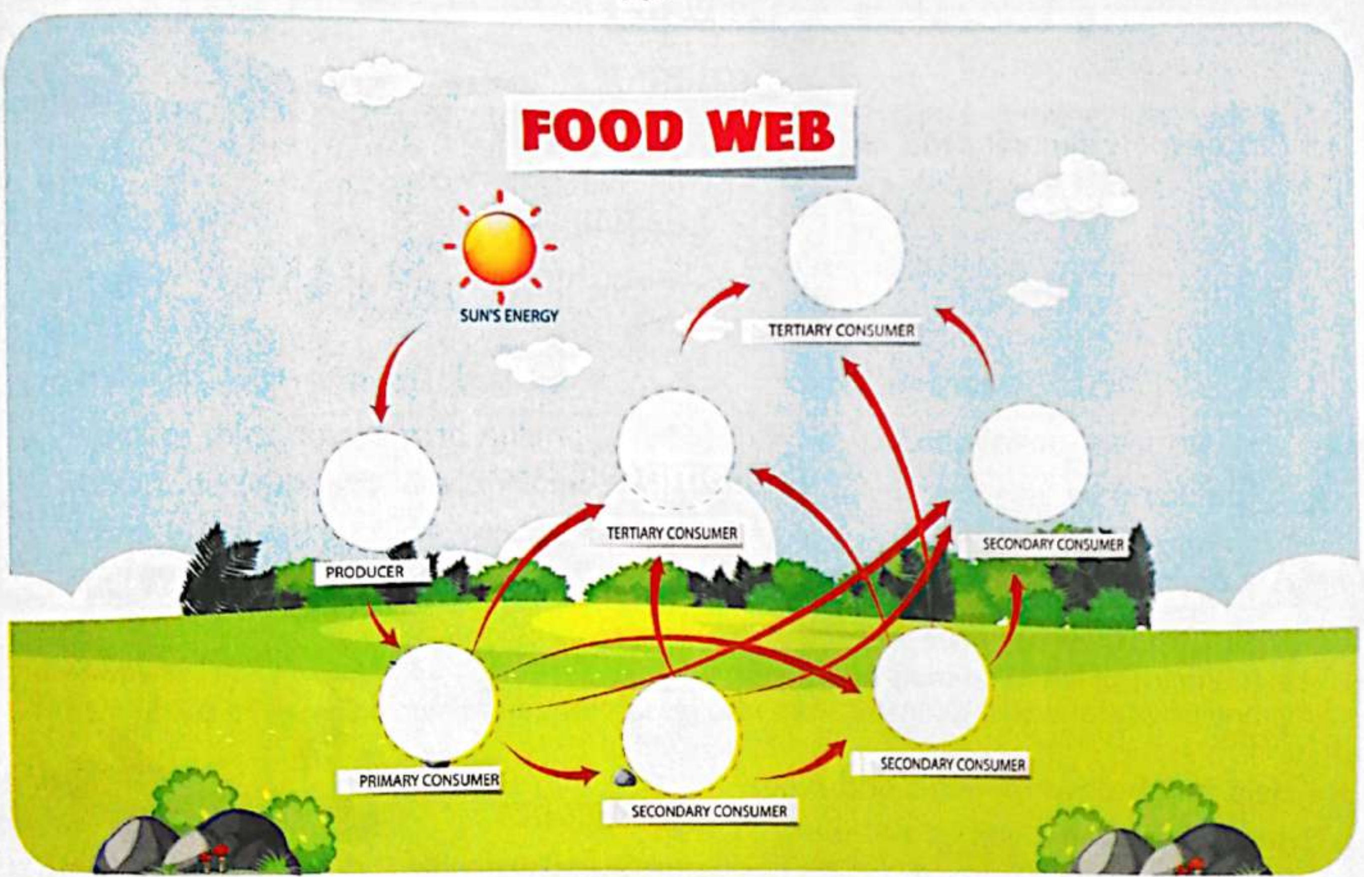






Look at the given animals, and based on the type of feeding of each, write the name of each animal in its place in the given food web...





13 Digital Extension Activity

Decomposition

- For more knowledge about decomposition process, use the Egyptian Knowledge Bank.



https://study.ekb.eg/





14 Activity: What are Decomposers?

- We have previously learned that decomposers are the "Final-link" in the food chain.
- When an organism dies, decomposition process takes place for months or even years to release nutrients back into the environment.
- Have you ever seen a mold growing on a piece of bread?

Yes ☐ No ☐

Who Eats Dead Organisms?

- Decomposers play an important role in the environment.

Let's observe the role of decomposers in energy transfer



Scavengers

- Are animals that eat dead animals.

Role:

- Break down food into smaller pieces.

Then

Decomposers

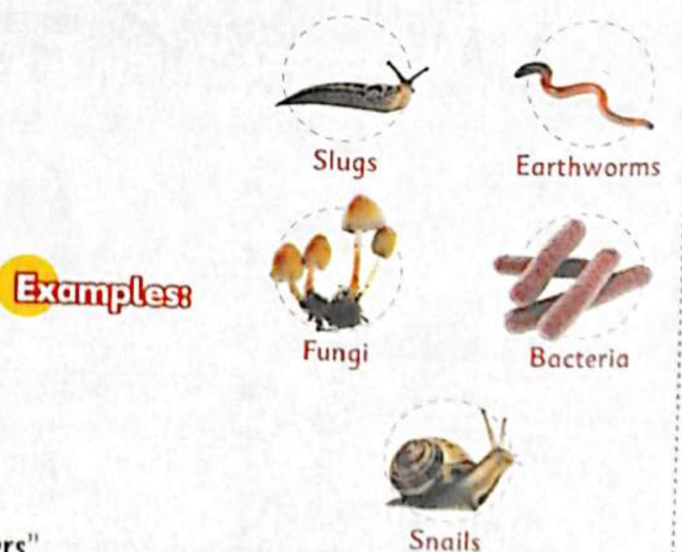
- Are a vital part of the environment.
- They complete the process and consume the remains of dead animals and plants.

Role:

- Help break down animals and plants into nutrients that can be returned (recycled) to the ecosystem.
- These nutrients are used by the plants to aid growth, to feed animals and the cycle continues...

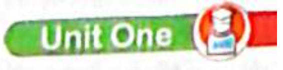
"Producers → Consumers → Decomposers"

Examples:



Parents' Tips

Discuss with your child the last-link in the food chain, then let him/her know how decomposers play an important role by returning the energy to the environment to keep it clean and in balance.



What Happens to Waste?

In our daily lives





- In our daily lives, humans produce a lot of waste that we throw into the trash cans to get rid of them, then the trash is taken to a landfill where it takes more and more space.

- To reduce these wastes, we must recycle them to make new products instead of going to landfills.

In nature







- A similar thing happens in nature, without decomposers dead things would build up just like trash in landfills.

- So, decomposition is the nature's recycling factory, by breaking down the dead animals and plants into nutrients and returning them to the environment.

- The world has a limited amount of nutrients (chemicals) that all organisms use to survive and grow.

Challenge

- Based on what you have learned about decomposers and their great role in the environment, predict what their absence would cause to the ecosystem.

15 Digital Extension Activity

Composting

- For more knowledge about Composting process, use the Egyptian Knowledge Bank.



https://study.ekb.eg/





Learn Exercise 2



1 Choose the correct answer:

1. Wolves prefer to hunt elk for food. If the elk population in an area declines because of hunting by humans, the wolves would most likely ....
   a. start to attack human hunters
   b. find an area with more elk
   c. become endangered and then extinct
   d. choose another food to eat

2. In a food web, spider is a ....
   a. producer
   b. primary consumer
   c. secondary consumer
   d. decomposer

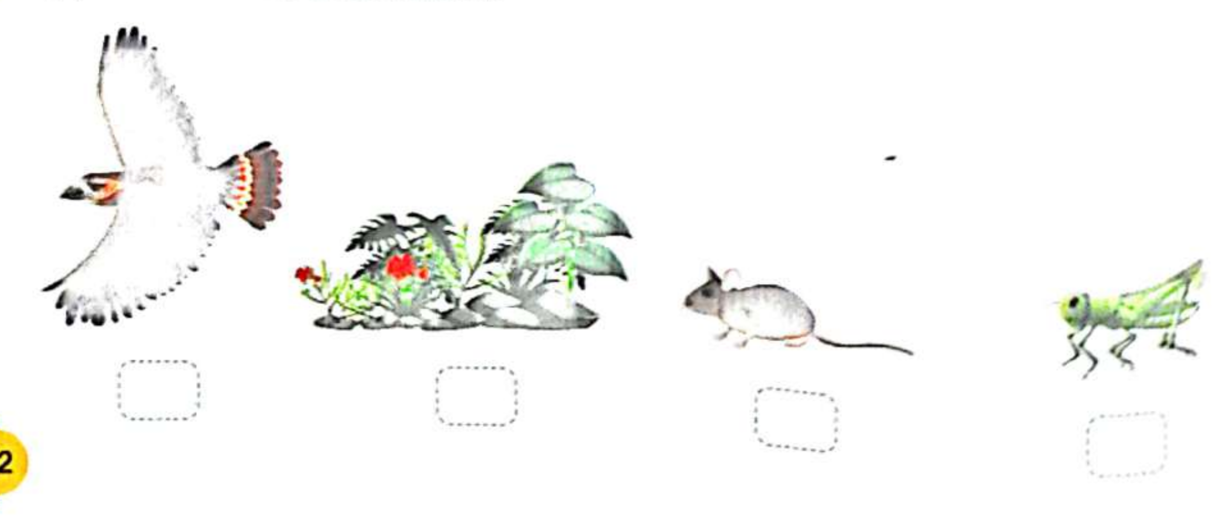
3. All the following are scavengers, except ....
   a. vultures
   b. slug
   c. crabs
   d. hyenas

4. The snake in a food chain acts as a predator, when it obtains its energy by ....
   a. eating grass
   b. eating decomposers
   c. eating a mouse
   d. making its own food

2 Put (✓) or (✗) in front of each sentence:

1. Predation is the nature's recycling factory. ( )
2. Earthworms, fungi and cockroaches are examples of decomposers. ( )
3. Scavengers are the animals which eat 1ry consumers. ( )
4. All organisms need energy to survive and grow. ( )
5. Grass is a primary consumer. ( )

3 Number the following living organisms (1-4) in the order of their appearance in a food chain:



Lesson 6



Activity 16 **Record Evidence: How Hawks Get Energy**

- You have learned how energy moves through an ecosystem.
- Now, you can write a scientific explanation, act like a scientist and follow the scientific method.
- Answer the "**Question**" from the "**Can You Explain?**" activity, then share what you have learned with your classmates.



Question:

How does energy flow through an ecosystem?

Claim:

Energy moves through an ecosystem by consumption.

Evidence:

- Energy's main source on Earth is the Sun.
- Producers get the energy they need from the Sun, then other organisms consume producers as food.
- Decomposing process provides food and energy for decomposers when living things die.
- There are interactions between consumers, where some animals (predators) feed on other animals (preys).

Scientific Explanation:

Energy moves through an ecosystem by consumption.

- In an ecosystem, plants are the producers, as they can make their own food using radiant energy.
- After that the 1^{ry} consumer will eat the plant, then the 2^{ry} consumer will eat the 1^{ry} consumer that has gained its energy from the plants that obtained their energy from the Sun.
- So, energy moves through an ecosystem because animals eat other organisms, and even when living things die, they feed the decomposers that help the soil and more plants can grow.



Parents' Tips

Help your child follow the scientific method to write a scientific explanation using evidence to support a claim.





Careers in Ecology: Plant-Community Ecologist

Plant-Community Ecologist

- Plant community ecologist's job/role is studying groups of plants.
- Dr. Becky Barak, is a plant-community ecologist.
- She learned about restoration ecology, which is rebuilding damaged habitats.
- She got to do her research on the prairie, as she found that different plants need different ways to transport or disperse their seeds.



Examples:





Sticky seeds

- Some plants have seeds that are really sticky.
- Their seeds can stick to your clothing, just like how they would stick to an animal.
- You might carry these seeds around with you all day without noticing or never know where or when they might be left.

Flying seeds

- Some plants have seeds that are dispersed by the wind.
- These seeds are released from plant (when ready).
- These seeds fly away to other habitats to grow in other places.



Parents' Tips

Help your child obtain information about habitats restoration and seeds dispersal from different resources to be able to predict the outcome of an ecology experiment.



Careers in Ecology

- This career focuses on plants, serving community and the ability to set ambitious and achievable goals in the service of our environment.
- Plant-Community Ecologists (like Dr. Barak), encourage people to spend time observing nature, so they can find and learn new things.
- Also, they can participate in conservation or restoration work in their areas to help take care of animals and plants (this may lead to ecology career later in life).
- Dr. Barak focused on restoring habitats for plants, by working on an experiment growing prairie plants all alone and together in groups, to see whether growing together in different combination can help her make better prairie restorations that will support more species and be more stable over time.



Prairies: are typically non-woody, or herbaceous plants, that grow where the climate is continental, with hot and cold extremes.



- Based on what you have learned, how could plants benefit from growing together in groups?

1 Science

- The effect of plant-microbes (Fungi) interaction in restoring prairie plants.



2 Technology

- Establishing smart watering systems to save water due to limited water supplies.



3 Engineering

- Inventing devices that are able to follow up different factors that may affect the Prairie restoration process, such as temperature, water speed and salinity.



4 Mathematics

- Make a bar graph that represents the change of Prairie species over time due to climatic changes.









18 Digital Extension Activity

Review: Energy Flow in Ecosystems

- For more knowledge about Composting process, use the Egyptian Knowledge Bank.



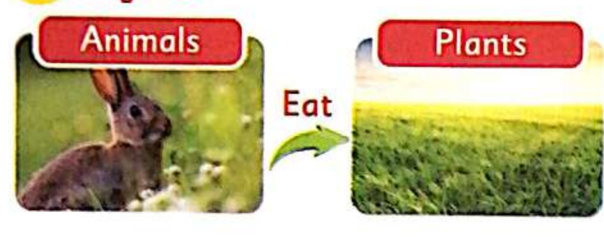


Review: Energy Flow in Ecosystems

Concept Main Ideas

- "Ecosystem" is a community of living organisms. (biotic) and non-living things (abiotic).
- In all ecosystems, Sun is the primary source of energy for all organisms on Earth, to live, grow and carry out life processes.
- Typical ecosystems would contain many kinds of life-forms such as; Ocean, Desert, Rainforest and Tundra.
- A healthy ecosystem sustains the life of all living members, by providing their basic needs "Food, Water and Shelter".
- Animals eat plants and/or animals in their ecosystem, they do not choose what to eat based on taste preferences, but on what their body needs to survive.

Examples:







- Movement of energy and nutrients through an ecosystem can be modeled using "Food chains".

"Food chain is a model that shows a linear set of feeding relationships and energy movement among living things within specific species".

- **There are different sizes of food chains:**

a Very short:

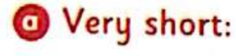
"Producer → Consumer"

Ex. Apple → Human



b Much longer:

Producer → "1ry Consumer → 2ry Consumer → 3ry Consumer"

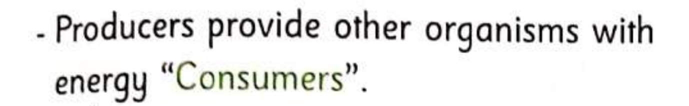


Ex. Plant → Grasshopper → Bird → Alligator

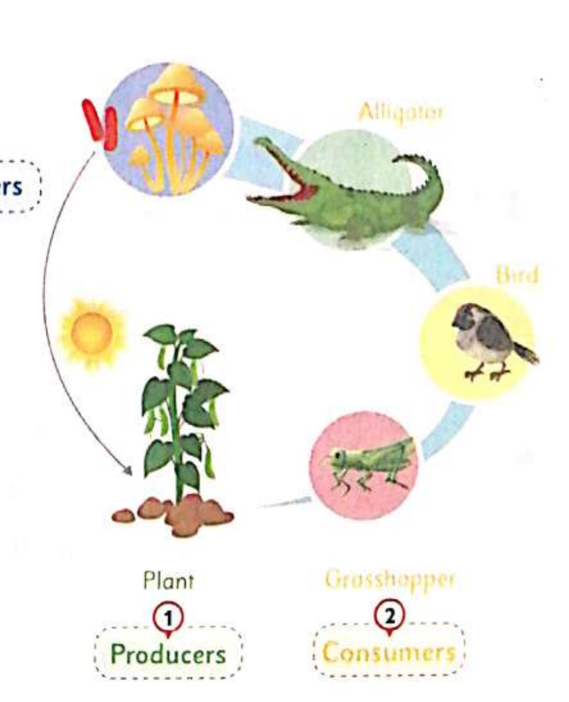
Parents' Tips

Help your child review and explain the main ideas of "How does energy flow in Ecosystems?"

- Organisms that do not obtain energy directly from the Sun need other organisms to obtain energy from.
  - The Sun provides organisms with energy, "Producers", as they can make their own food.



  - Producers provide other organisms with energy "Consumers".
  - When living organisms die, they decay through decomposition process carried out by "Decomposers".



So, the energy of the Sun passes to the Plant, then to the Grasshopper, to the Bird to the Alligator and finally to the decomposers.

- Consumers can eat other consumers, this is called "Predator-Prey" relation, where the "Predator" is the animal that eats another animal, while the "Prey" is the animal eaten by another animal.

- Several interconnected food chains, that show the relationship of food and energy that pass from one organism to the other, forms "Food Web".

- "Food web is a model that shows different feeding relationships among living things".
  - Food web is a better choice than food chain, because the web helps to show the overlapping relationships within an ecosystem.

Owl, Fox, Bird, Rabbit, Mouse, Grasshopper, Carrot, Grass, Grain

- When organisms die, Scavengers (Ex. Vultures) eat the dead bodies, then Decomposers (Ex. Fungi, Bacteria, Earthworm) continue the process as they consume the remains of dead animals/plants to break them down into nutrients, that can be returned to the environment, used by the plants to aid their growth, to feed animals, and the cycle continues...



Concept 2
Energy Flow in Ecosystems

Remember Understand Apply Analyze

1 Choose the correct answer:

1. All .... need a source of energy.
   a. rocks b. minerals c. oceans d. organisms
2. During photosynthesis, radiant energy flows from the .... to the plant.
   a. nutrients b. Moon c. Sun d. water
3. An ecosystem consists of ....
   a. living things only b. non-living things only
   c. living and non-living things d. No correct answer.
4. Plants are .... that get energy from the Sun to make their own food.
   a. decomposers b. consumers c. producers d. non-living
5. Food chains include producers, consumers, and decomposers, which of the following is an example of the three?
   a. Seeds, Mouse, Owl b. Fly, Spider, Grasshopper
   c. Nuts, Squirrel, Fungus d. Leaf, Eagle, Robin
6. Slug is an example of a ....
   a. producer b. scavenger
   c. decomposer d. No correct answer.
7. Which organism gets energy from another organism?
   a. A cactus. b. An acacia tree. c. A rabbit. d. A flower.
8. .... carry out the processes of breaking down or decaying dead organisms.
   a. Producers b. Consumers c. Decomposers d. All the previous answers.
9. Energy in the form of food flows from one organism to another. Which is the correct direction of this energy flow?
   a. From producers to consumers.
   b. There is no energy flow between producers and consumers.
   c. Back and forth between consumers and producers.
   d. From consumers to producers.
10. Which of the following represents "prey-predator" relationship? ....
    a. Grass and Snake b. Snake and Mouse
    c. Owl and Green plant d. All the previous answers.

11. A grasshopper eats grass and seeds, the mouse eats the grasshopper, and the owl eats the mouse. This is an example of a/an ....
    a. carnivore b. insectivore c. food web d. food chain

12. A food web shows the ....
    a. non-living features in the environment
    b. feeding relationships between organisms
    c. way that heat is trapped in an environment
    d. substances that contaminate the atmosphere

13. Animals are .... as they must eat other living things to get energy.
    a. producers b. consumers
    c. decomposers d. All the previous answers.

14. What are the complex interactions of producers, consumers, and predators called?
    a. A niche b. A habitat c. A food web d. A food chain

15. When the decomposers disappear from a habitat, ...
    a. they produce their own food using radiant energy
    b. they move to another ecosystem
    c. they will recycle the ecosystems environment
    d. the dead bodies will cover this habitat

16. Identify the correct order of this food chain.
    a. Hawk → Snake → Mouse → Plant
    b. Mouse → Snake → Hawk → Plant
    c. Plant → Mouse → Snake → Hawk
    d. Plant → Hawk → Mouse → Snake

17. In any food chain, primary consumers eat ....
    a. plants and other animals b. plants
    c. large meat-eating consumers d. All the previous answers.

18. .... is a community of living things, non-living things, and the environment.
    a. Food chain b. Ecosystem c. Food web d. No correct answer.

19. Wolves prefer to hunt deer for food. If the deer population in an area declines because of hunting by humans, the wolves would most likely ....
    a. find an area with more deer b. start to attack human hunters
    c. become endangered and then extinct d. choose another food to eat

20. All the following are ecosystems except " .... ".
    a. Ocean b. Desert c. Space d. Rainforest



2 Complete the following sentences using words between brackets:

1. The primary source of energy is the .... (green plants – Sun)
2. .... contains biotic and abiotic factors. (Ecosystem – Sunlight)
3. The consumer that feeds on an animal that feeds on producers is a .... consumer. (primary – secondary)
4. Green plants are classified as .... (producers – decomposers)
5. The consumer that is eaten by another animal is called ....(a predator – prey)
6. Organisms that can make their own food are .... (decomposers – producers)
7. The consumer that eats another animal is called a .... (predator – prey)
8. .... is a model that shows a linear set of feeding relationships and energy movement among living things and energy movement. (Food web – Food chain)
9. The .... is a primary consumer. (mouse – hawk)
10. During photosynthesis process, radiant energy changes into .... energy. (heat – chemical)
11. Any food chain begins with a .... (producer – decomposer)
12. .... are organisms that help in the animal's decomposition process. (Producers – Decomposers)
13. Any food chain begins with producers and ends with .... (producers – decomposers)

3 Put (✓) or (✗) in front of each sentence:

1. The energy flows in the food chain from consumers to producers. (   )
2. Food web is a model that shows a linear set of feeding relationships and energy flow among living organisms. (   )
3. Long food chains consist of more than 1 consumer. (   )
4. Scavengers consume the remains of dead animals and plants. (   )
5. Without decomposers, the Earth would be full of dead bodies. (   )
6. Composition, is the nature's recycling factory. (   )
7. Food chains overlap within the ecosystem forming food webs. (   )
8. Hyenas, snails, slugs and earthworms are examples of decomposers. (   )
9. Producers are the first-link in the food chain while consumers are the final-link. (   )
10. Energy does not flow between 2 consumers at the beginning of the food chain. (   )



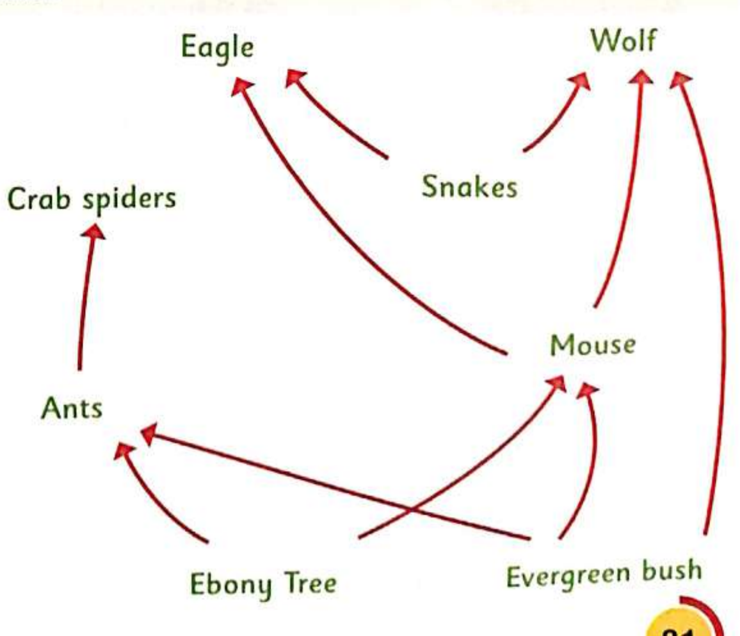


4 Write the scientific term for each of the following:

1. It is a fundamental process to Earth, where plants absorb Sun's energy through their leaves to make their own food by converting water and carbon dioxide from the air into glucose. (..............................)
2. It is a model that shows a linear set of feeding relationships and energy movement among living things within specific species. (..............................)
3. They are the organisms that are able to produce their own food. (..............................)
4. They are the animals that eat plants. (..............................)
5. They are the animals that eat primary consumers. (..............................)
6. They are the large meat-eating animals that eat secondary consumers. (..............................)
7. They are the animals that eat other animals. (..............................)
8. They are the animals eaten by other animals. (..............................)
9. It is the final-link in a food chain. (..............................)
10. It is a model that shows many different feeding relationships among living things. (..............................)
11. They are the animals that eat dead animals. (..............................)
12. They are the nature's recycling factory. (..............................)
13. It is the source of radiant energy to the plants. (..............................)
14. It represents the energy flow between organisms in an ecosystem. (..............................)

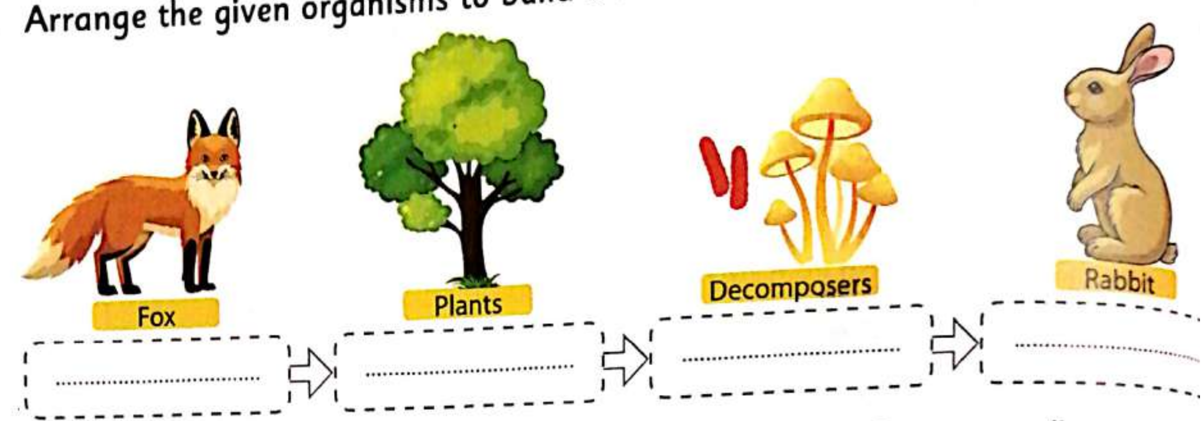
5 Answer the following questions:

1. **Which of the following is a secondary consumer?**
   a. Ebony tree
   b. Snakes
   c. Wolf
   d. Ants

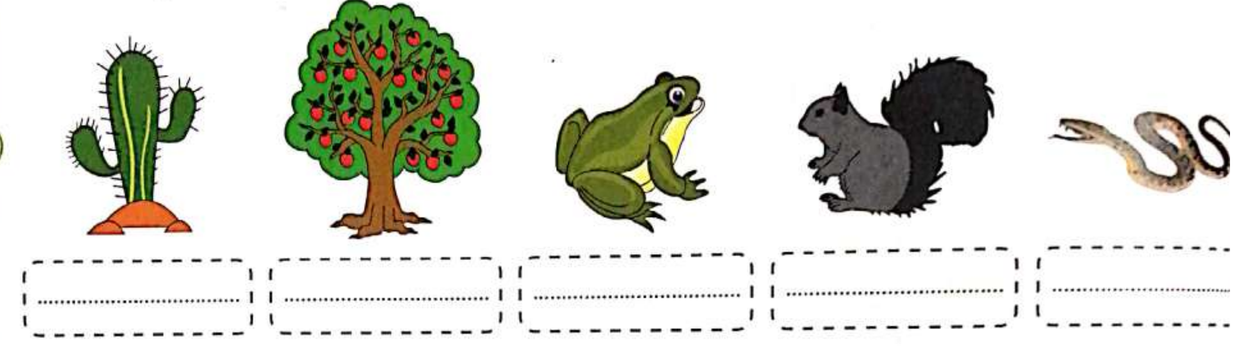




2. Arrange the given organisms to build a food chain:

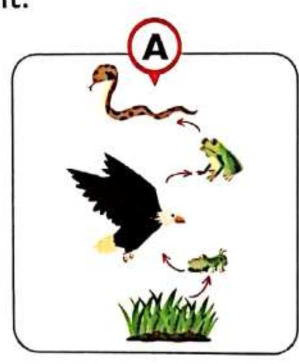


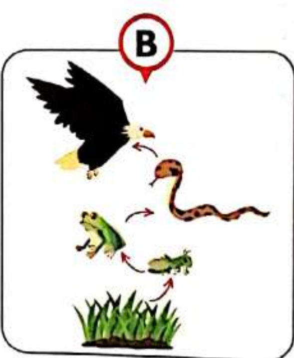
3. Classify the following organisms into "Producers and Consumers":

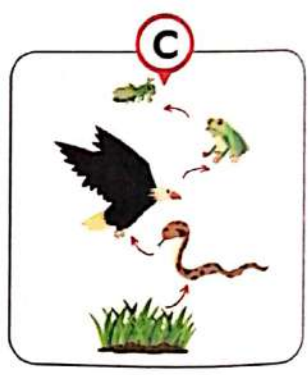


4. Look at the following ecosystem, then circle the correct food chain that represen this environment:



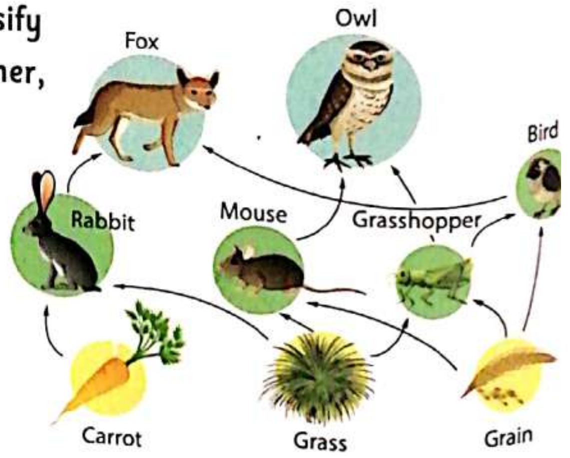






5. Look at the opposite food web, then classify each organism into "Producer, 1ry Consumer, 2ry Consumer" in the given table:

Producer	
1ry Consumer	
2ry Consumer	



1 Choose the correct answer:

1. Which of the following organisms comes at the end of a food chain?
   a. Decomposers b. Producers c. Consumers d. No correct answer
2. Which of the following represents a food chain?
   a. Hawk → Crocodile → Mouse → Grasshopper
   b. Mouse → Rabbit → Cactus → Lattice
   c. Plant → Mouse → Snake → Hawk
   d. Plant → Hawk → Mouse → Snake
3. .... are the organisms that are able to produce their own food.
   a. Decomposers b. Producers c. Consumers d. Insectivores
4. All organisms need ....
   a. predators b. energy c. decomposers d. No correct answer
5. A food web shows the ....
   a. non-living features in the environment
   b. feeding relationships between organisms
   c. way that heat is trapped in an environment
   d. substances that contaminate the atmosphere

2 Write the scientific term for each of the following:

1. They are the organisms that cannot produce their own food, but they must eat other living things to get energy. (....................)
2. It is a community of living things, non-living things, and the environment. (....................)
3. They are the organisms that carry out the processes of decomposition by breaking down or decaying dead organisms. (....................)
4. It is the first-link in a food chain. (....................)
5. They are the animals that eat plants only. (....................)

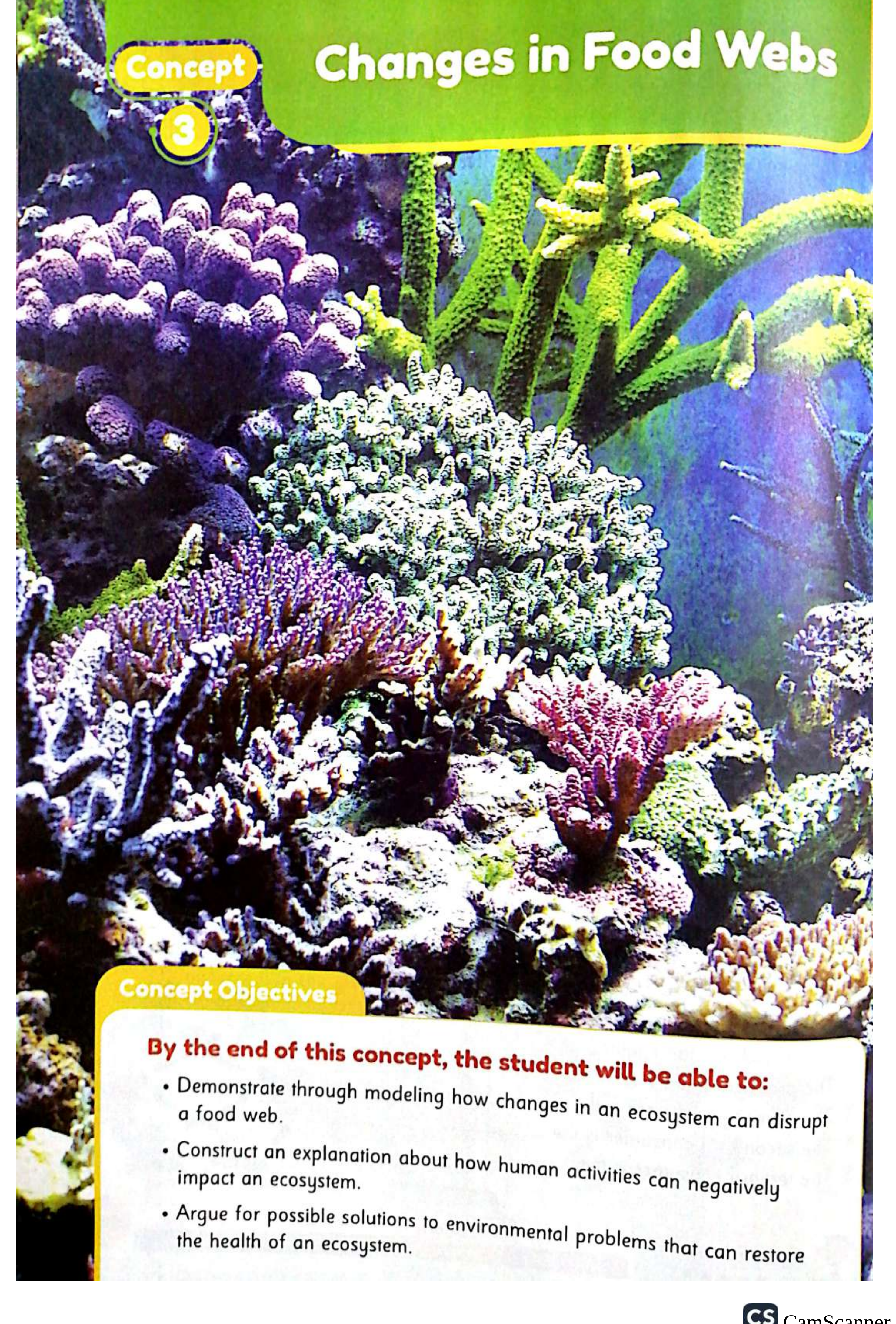
3 Look at the opposite figure, then answer:

1. This diagram represents a ....
   (food web – food chain)
2. The producer is the ....
3. The primary consumer is the ....
4. The secondary consumer is the ....
5. The tertiary consumer is the ....

FOX
EAGLE
BIRD
GROUND SQUIRREL
GRASSHOPPER
PLANTS

Assess Your Progress ★★★★★

< 50%	50 : 64%	65 : 84%	85 : 100%
Study again	Practice more	Solve more exams	Well done!



Concept 3

Changes in Food Webs

Concept Objectives

By the end of this concept, the student will be able to:

- Demonstrate through modeling how changes in an ecosystem can disrupt a food web.
- Construct an explanation about how human activities can negatively impact an ecosystem.
- Argue for possible solutions to environmental problems that can restore the health of an ecosystem.



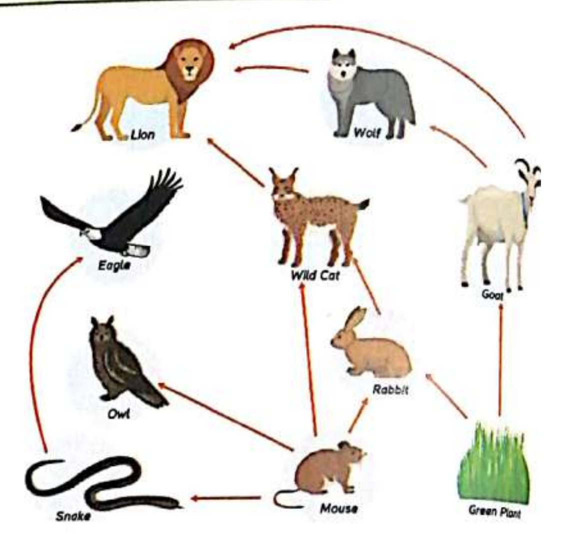


Lesson 1



Activity 1 Can You Explain?

- We have previously learned that an ecosystem is a natural area that includes living organisms and non-living things.
- All living organisms including humans in the ecosystem, interact in food webs to survive.



The opposite figure represents the flow of energy in the food web, which starts from .... and ends in ....

Answer the following:

1. What causes a lake to dry up?

   The hot sun ☐ The rain ☐ The drought ☐

2. Do you believe that the drying of a lake affects the food webs inside it?

   Yes ☐ No ☐

What might happen to a food web when an organism or the environment changes within an ecosystem



- All organisms in the food web may be affected as follows:

  - Producers will disappear.
  - Consumers will have to move to another place or will die.
  - If there is a large number of of organisms of the same species their food and water resources may disappear.







So, the overabundance or the lack of a specific organisms affects the food webs through the ecosystem.

Parents' Tips

Help your child discover the factors that may affect the health of an ecosystem.

Overabundance	وفرة
Lack	نقص



Activity 2 Protecting Ecosystems



- Which of the following actions preserves the marine environment?

  Stop cutting down forests ☐   Stop planting trees ☐

  Stop throwing litter into the waterways ☐

Protection of Water Ecosystems

- Human activities can affect marine habitats through **overfishing, ocean pollution, the introduction of invasive species,** as well as many other forms of impact.
- It is necessary to take some environmental protection programs to preserve marine habitats from destruction.

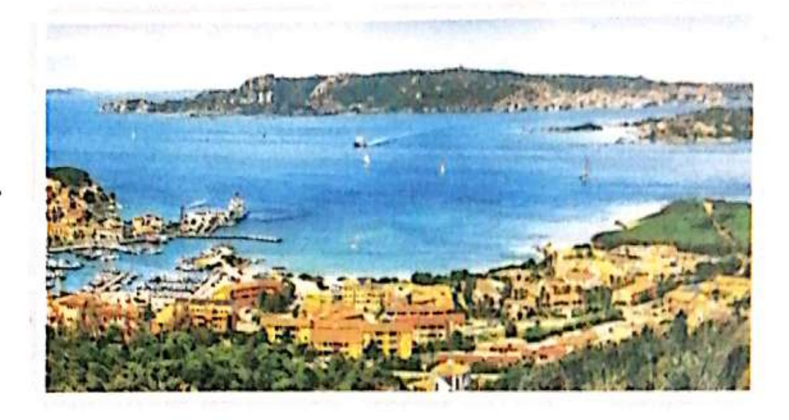
Let's observe an island that uses a protection system to preserve its organisms.

Example:

Palau Island

It is located in the western Pacific Ocean.

It is an island that uses multiple conservation programs to protect the marine environment and its resources.



- Many factors cause the pollution of water on Palau island:

1. Water runoff (flowing) on land
2. Human land activities, such as cultivation of lands and animal raising
3. Dumping plastic or other wastes into water

How can we protect the marine environment on Palau island



1. Land activities must be managed to control the quality of the marine environment.
2. Prevent fishermen from overfishing the coral reefs.



Search the internet

- The reason why ocean life is affected by the changes that occur on land.

Parents' Tips

Help your child explore factors that affect the marine environments.

Overfishing	الصيد الجائر
Invasive species	الكائنات المفترسة
Conservation programs	برامج الحفاظ على البيئة







Activity 3 What Do You Already Know About How Food Webs Can Change?

- When any organism is removed from the food web, the ecosystem will be ....

improved ☐ destroyed ☐

Changing in the Ecosystem affects the food web

- Any change in the ecosystem affects the food web and may cause the missing of some organisms, and ecosystem imbalance occurs.

Examples:

1

If	Then
• There is a gentle (a little amount of) rain in the desert.	1. Rain water will feed the plants. 2. The producer will feed the organisms.



In this case, the desert ecosystem might be improved.

2

If	Then
• There is a heavy rain in the desert.	• The water will cause flooding and destroy the ecosystem.



In this case, the desert ecosystem might be harmed.

3

If	Then
• There is a drought and all the grass die.	• The plants will die as well as the other organisms.



In this case, the food web in the ecosystem might collapse (be destroyed).



4

If	Then
• There are many top predators in a food web.	• The top predators will eat all the organisms.



In this case, the organisms in the food web might be harmed.

Parents' Tips

Help your child predict effects of changes that occur in a food web.

Improve	تحسين
Destroy	تدمير



Food Web

How does a food web work 

- In a food web, each organism has a specific role.

Let's find out the role of each organism through the following food web.

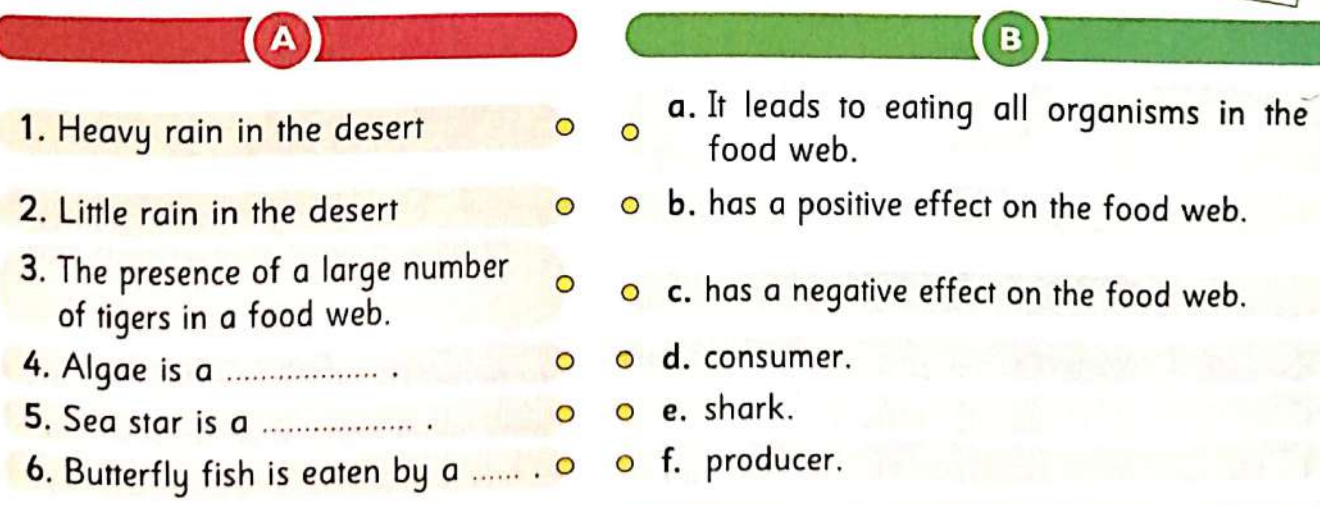
- The following image represents an ocean/coral reef food web, which includes different organisms interacting with each other to get their food through the ecosystem.



Checkpoint




Match from column (B) what suits in column (A):



(A)	(B)
1. Heavy rain in the desert	a. It leads to eating all organisms in the food web.
2. Little rain in the desert	b. has a positive effect on the food web.
3. The presence of a large number of tigers in a food web.	c. has a negative effect on the food web.
4. Algae is a	d. consumer.
5. Sea star is a	e. shark.
6. Butterfly fish is eaten by a	f. producer.

1. ....
2. ....
3. ....
4. ....
5. ....
6. ....







- We have previously learned that food webs help us understand the feeding relationship among species within a community.

Now, complete the following food web using the given words, then classify the food web organisms into (producers-consumers and decomposers).



Sun energy

A ....

Plant

Snail

B ....

Bird

C ....

Eagle

Rabbit

Bacteria

Producers	Consumers	Decomposers
•	•	• ....
•	•	• ....

Parents' Tips

Help your child complete the food web to check his/her understanding of the feeding relationships among species.





Lesson 2



5 Activity **Hands-On Investigation: Energy Flow Body Model**

(Part I : Pass It On)



- The arrows in the food web represent the flowing of ....

  energy ☐ force ☐ organisms ☐

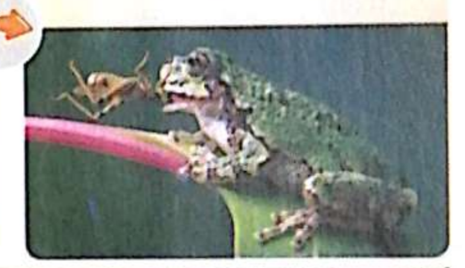
The Flow of Energy through a Food Web

- A food web can describe how energy and nutrients move through an ecosystem.
- The pathway of energy through organisms in the food web is described as follows:

  - Plants produce the energy.
  - The energy moves up to a higher level such as herbivores.
  - Then energy is transferred from one organism to the other as carnivores that eat the herbivores.







Let's conduct an experiment to model the flow of energy through a food web.



Aim: Make a model of energy flowing through a food web.

Materials: Index cards labeled with organisms – a picture of food web – paper squares 3 cm X 3 cm (10 per student)

Caution!! Follow the lab safety guidelines while performing an experiment.

Steps	Illustration
1 Post a picture of a food web in a central location.	  
2 Assign your classmates different roles of organisms to play using index cards.	
3 Give each one 10 paper squares to represent their energy content.	

Parents' Tips

Help your child conduct this activity to check his/her understanding of the energy flow through a food web.

Assign تكليف







4. Play with them a game of predator-prey tag, where they capture prey or evade predators.

5. If a student "is caught" one of the paper squares will be given to the predator and the captured student moves to the side of the activity (with their remaining squares).



6. Continue the game through decomposers.

7. When students are finished compare the number of paper squares left in the game to the number of paper squares that have been removed from the game.

Observation:

- A part of the energy of one organism moves to another organism, but most of the energy never leaves the ecosystem.
- There is a transfer of energy between organisms in an ecosystem.

Conclusion:

- The energy in the ecosystem remains the same.
- Although energy is transferred between living things, most of the energy is recycled by the decomposer back into the ecosystem.



Energy changes occur when a predator gains energy from the prey by consuming it.

Capture يمسك | Evade يهرب



6 Activity Desert Food Web

- What happens to an organism when the organism it consumes is removed from the food web?

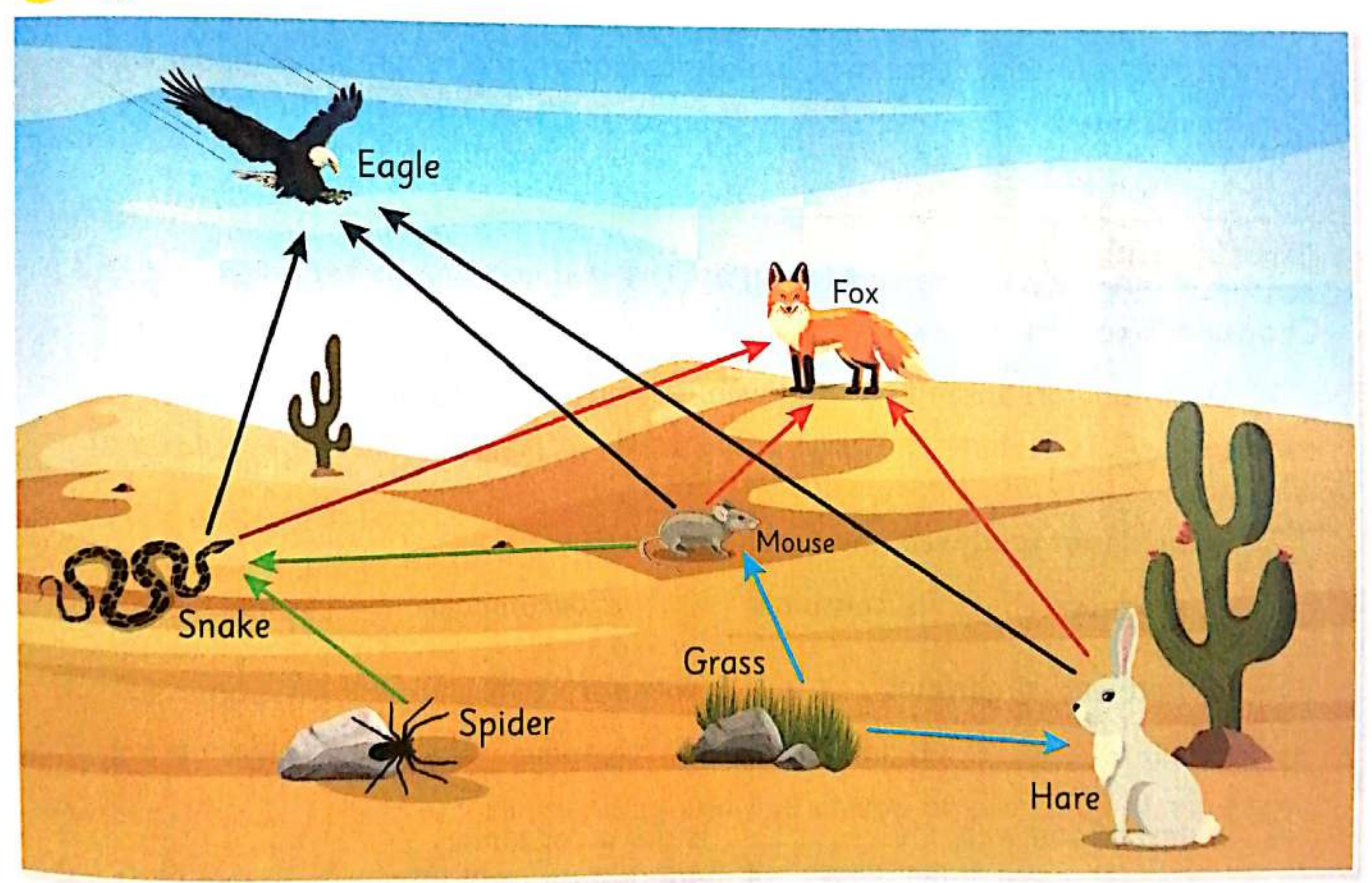
Will survive ☐ Will die ☐

Desert Food web

- A food web shows how organisms are interdependent. Each organism depends on other organisms to get food.
- When one organism is reduced or removed, the other organism that consumes it will die.

Let's observe the Desert Food Web to identify the interactions between its producers, consumers, and decomposers.

Example:



- After identifying the desert food web, **what would happen if all the grass was removed?**

1. The hare wouldn't have any food, so it would die.
2. After that the eagle and fox would have less food.

Parents' Tips

Help your child understand how organisms are interdependent through a food web.



How does energy travel from the grass to the eagle



- The grass takes the energy from the sun.



Then energy transfers to

- The hare when it consumes the grass.

Then energy transfers to

- The eagle when it consumes the hare.



Challenge

Search an ecosystem and create a food web model that represents the interactions among its producers, consumers, and decomposers, then share your model with your classmates.

Checkpoint

Choose the correct answer:

1. When any organism in a food web is removed, the food web will ....
   a. continue　b. collapse　c. develop　d. start
2. In the desert food web, the rabbit is a ....
   a. producer　b. consumer　c. decomposer　d. plant
3. In food web, organisms .... with each other to get their food.
   a. kill　b. interact　c. move　d. push
4. In desert food web, the .... is not a consumer.
   a. rat　b. rabbit　c. grass　d. fox



Walking bare foot can easily hurt you or pick up harmful germs or get hurt.







Learn Exercise 1



1 Choose the correct answer:

1. The lion is considered one of the ....
   a. producers b. herbivores c. carnivores d. decomposers
2. .... affect the marine habitats.
   a. Human activities on land b. Human activities in water
   c. Human activities in space d. Both (a) and (b)
3. Increasing the number of top predators has a/an .... effect on the ecosystem.
   a. negative b. positive c. beneficial d. increasing
4. In food web .... produces its own food.
   a. grass b. plant c. algae d. All the previous answers
5. Overhunting of humpback whales will result in which of the following changes to this ecosystem?
   a. A decrease in the puffin number.
   b. An increase in the number of krill.
   c. An increase in the phytoplankton.
   d. Increasing the competition between top predators.

phytoplankton → Krill
Krill → Humpback whales
Krill → Herring
Krill → Jellyfish
Herring → Puffins
Herring → Codfish
Jellyfish → Sea turtles
Codfish → Sharks

2 Complete the following sentences using the given words:

(improves – death – nutrients – destroys – constant – energy– Decomposers)

1. Little amount of rain .... the desert habitat, while heavy rain .... the desert habitat.
2. Drought causes plant ....
3. The food web describes the flowing of .... and .... between living organisms.
4. .... help in recycling energy and nutrients to be reused by plants again.
5. The amount of energy that flows through the ecosystem is ....

3 Answer the following question:

– There are different levels of consumers, what are they?

....



Lesson 3



(Part 2 : Pollution)

Experiment Time

- The pollution has a .... effect on food webs.

negative ☐ positive ☐

The Pollution Impact on the Food Web

How does pollution get into the food web



Pollution gets into the food webs through different ways:

1. Contaminating the resources that plants and animals consume.
2. Organisms contact with the toxin through direct or indirect exposure.







Food may become scarce (rare) for another species when an animal dies because of exposure to a pollutant "Sea birds lose their food when small fish die due to water contamination".



Search the internet

- Search for different types of environmental pollutants.

Parents' Tips

Help your child understand how pollution can permeate a food web.

Scarce	نادر
Exposure	التعرض
Contamination	التلوث

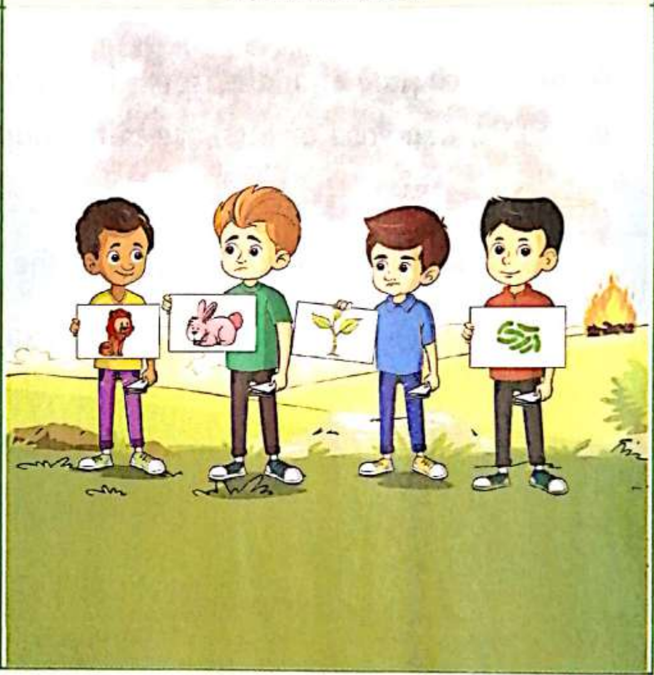
Let's make a model to show how pollution might affect other organisms within a food web.



Aim: Make a model to show the impacts of pollution on a food web.

Materials: Index cards labeled with organisms – picture of a food web – paper squares (3cm x 3cm) 10 per students.

Caution!! Follow the lab safety guidelines while performing an experiment.

Steps	Illustration
1. Post the food web picture used in the previous investigation. 2. Assign your classmates different roles of organisms to play using index cards. 3. Give each one 10 paper squares to represent their energy content. 4. After playing the predator-prey tag game, ask what would happen if there were a fire or smoke?	

Observation:

- The plants "grasses" are covered with ash or burned.
- The animals may have breathing difficulities.

Conclusion:

- **Pollution** affects all living organisms in the food web.





- What would happen to a number of organisms when the temperature increases to the extreme?

  Their number will increase. ☐ Their number will decrease. ☐

Effect of Climate on Population

Population

It is the number of organisms of one type of species living in an area.

- When the climate changes, some living organisms may die while others increase, which leads to a decrease or increase in the number of a certain type of living organism.

Population Change

It is any increase or decrease in the number of organisms in an area.

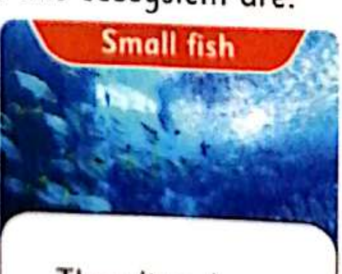
Let's find out how population changes through the following ecosystem



- The living organisms that live in this ecosystem are:



Their nests are on the top of mountain cliffs.



They live deep in the sea.



They float on the surface of the sea. (They need cold water to survive.)

Parents' Tips

Help your child understand that climate change is the biggest threat to ecosystems worldwide.

- The interaction between organisms in this ecosystem can be described as follows:

1. Micro-organisms can make their own food (Producer). → are eaten by → 2. Small fish (First consumer) → are eaten by → 3. Seabirds (Second consumer)

What happens when the climate changes and the water becomes warm



1. Micro-organisms will move to cooler water.
2. The small fish that feed on micro-organisms will move to a new habitat.
3. The sea birds will have no food, some of them will find a new habitat and others will die.

So, all species in an ecosystem depend on other species for survival (such as the small fish that depend on micro-organisms) and any increase or decrease in the number of organisms of one species will affect the population of other species.

How does the change in the climate affect the population of a species



- Climate change has a great effect on the population as follows:

(1) When the climate change is suitable

- The population of species increase.

(2) When the climate change is unsuitable

- The organisms would either die or move to another place.

Checkpoint



Put (✓) or (✗) in front of each sentence:

1. Population changes occur as a result of climate change. (   )
2. Seabirds depend on small fish to survive. (   )
3. Micro-organisms are the producers in the food web. (   )
4. When climate changes are suitable, the number of living organisms decreases. (   )



Lesson 4



- Which of the following are from the basic needs of living things?

Food ☐ Gasoline ☐ Water ☐ Juice ☐ Air ☐

Habitat Loss

- We have previously learned that, the habitats provide organisms with the resources that they need to survive such as:

(food - water - air - shelter and space)

Habitat Loss

It is the destruction of habitats or their qualities that harms organisms.

What is the reason that leads to habitat loss?

- The reason is the human activities that change the habitat like:

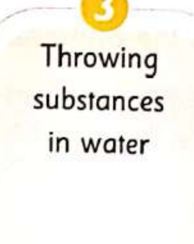
1. Adding buildings to the habitat



2. 
Adding roads



3. Throwing substances in water





4. 
Overfishing

5. Changing the weather such as changing the temperature of the ocean water





Habitat loss is one of the main causes of living organism's **extinction** (the organisms are lost from the ecosystem).

Parents' Tips

Help your child explore the reasons of habitat loss which impacts its living organisms.

Extinction الانقراض





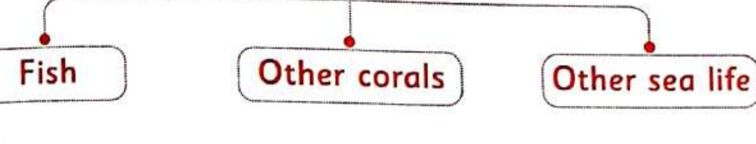
Coral Reefs

What are the coral reefs 

- They are the habitats for many living organisms, as they are some of the most valuable ecosystems on Earth.

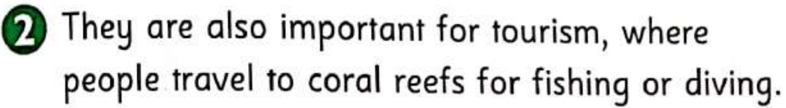
The importance of the coral reefs:

1. Supporting large numbers of species, such as:



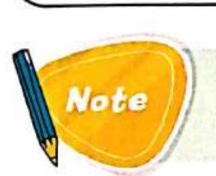
Fish | Other corals | Other sea life

2. They are also important for tourism, where people travel to coral reefs for fishing or diving.





- This type of tourism provides local hotels, restaurants, and other businesses with visitors and income.



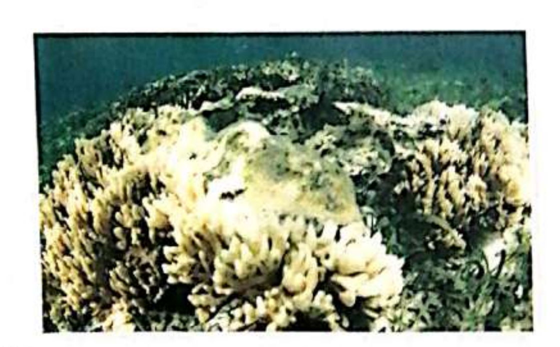
Note Scientists believe that there are millions of species living in and around reefs that have not been discovered yet.

Coral Bleaching and its impact



Coral bleaching

It is the turning of corals into white when corals get rid of the algae living in their tissue when the water temperature rises.



Coral bleaching impacts

1. Affect coral reefs negatively (They can't survive.)
2. Affect fish communities that depend on coral reefs negatively.
3. Affect human communities that depend on coral reefs and fish for food negatively.



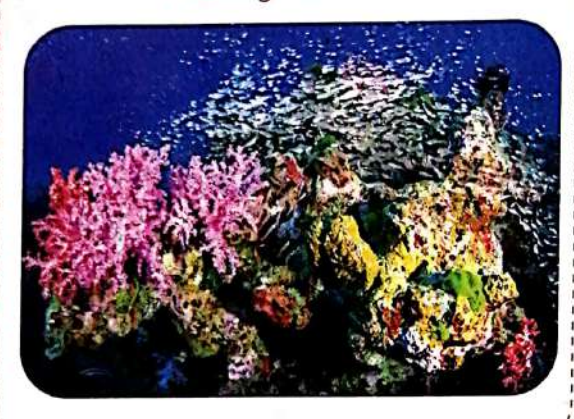


Let's find the differences between healthy habitat and destroyed habitat and their impacts on food web

Healthy habitat

- Provides all the needs of the organisms that live there to survive.
- There will always be food for every organism in the food web.

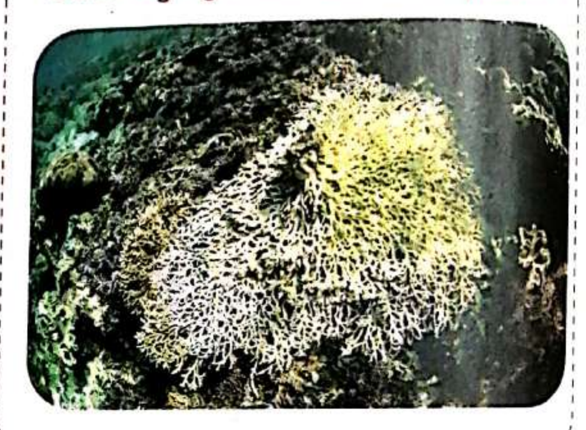
Ex.: Healthy coral reef



Dying (destroyed habitat)

- Can't provide the organisms that live there with their basic needs.
- All organisms are negatively impacted due to lack of food.

Ex.: Coral dying from warm temperature



Checkpoint

Complete the following sentences using words between brackets:

1. .... causes habitat loss. (Overfishing – Feeding)
2. Habitat loss causes .... of organisms. (disappearing – appearing)
3. Coral bleaching changes the color of corals into .... (white – red)



- We have previously learned that human activities have a negative impact on the ecosystem.
- Throwing plastic into water has a .... effect on the organisms in the ocean ecosystem. negative ☐ positive ☐



Plastic Pollution

What are the effects of littering plastic into ocean on marine life ?

- Plastic has a bad effect on marine animals as they can't know the difference between plastic and real food such as:









Example:

- The sea turtle cannot see the difference between a jellyfish and a piece of plastic in the water.

So, sea turtles eat a lot of plastic thinking that it is a jellyfish.



Plastic is not nutritious. It can be toxic and sharp, so it harms organisms that live in the sea or ocean.



Around 8 million tons of plastic end up in the ocean every year. Most of them come from land. That is like dumping one garbage truck full of plastic into the ocean every minute.

Parents' Tips

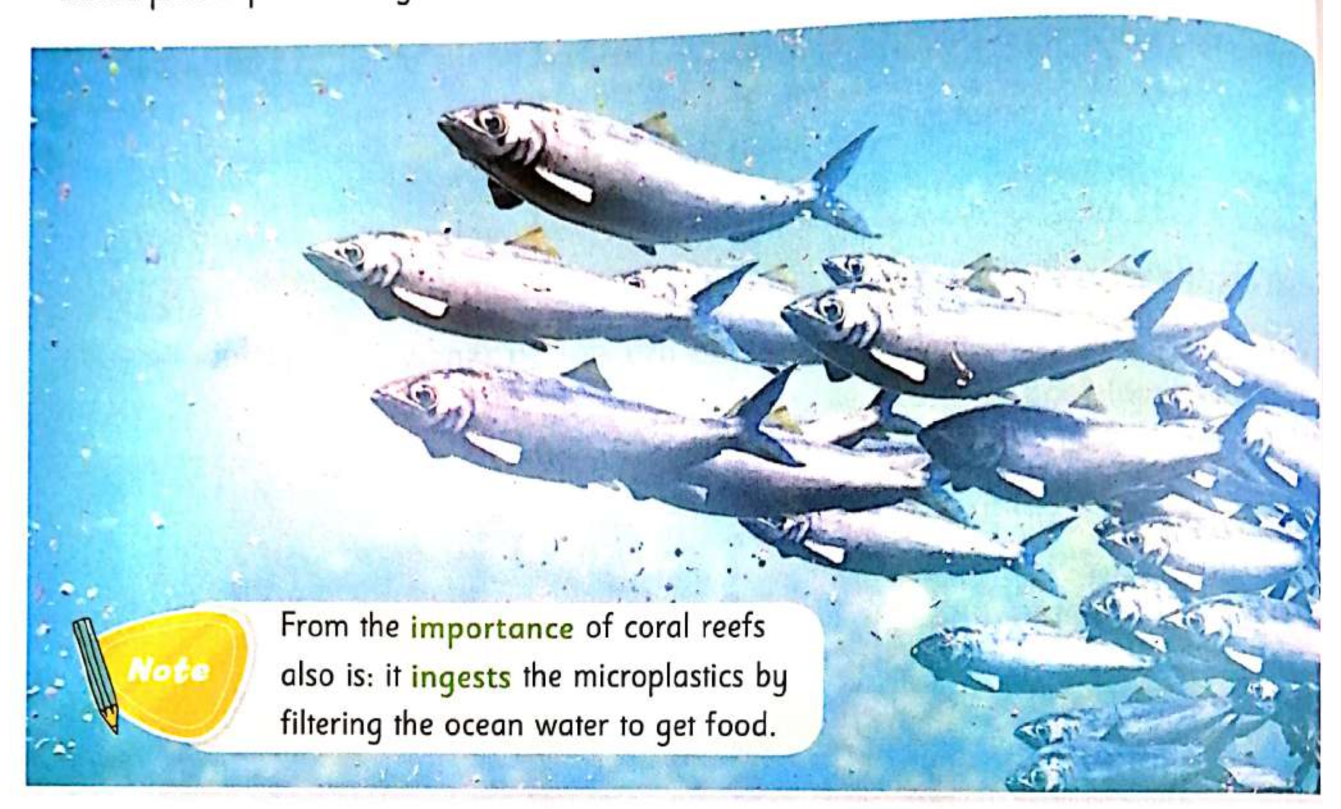
Help your child your child understand the negative impact of littering plastic on marine environment.

Littering	القاء نفايات
Nutritious	مغذيه



Microplastics

- They are small pieces, smaller than a grain of rice, which are produced from the broken down plastic products by the effect of Ultra-violet rays from sunlight.



Note From the importance of coral reefs also is: it ingests the microplastics by filtering the ocean water to get food.

Reducing the amount of plastic in marine life:

The amount of plastic in the ocean can be reduced by:

- Using less plastic
- Recycling
- Stop littering plastic into ocean

Checkpoint

Put (✓) or (✗) in front of each sentence:

1. Plastics are nutrient sources for marine organisms. ( )
2. Microplastics are useful for marine organisms. ( )
3. Plastic recycling helps to reduce plastic amounts in the ecosystem. ( )
4. Plastic products are the real food of the sea turtle. ( )



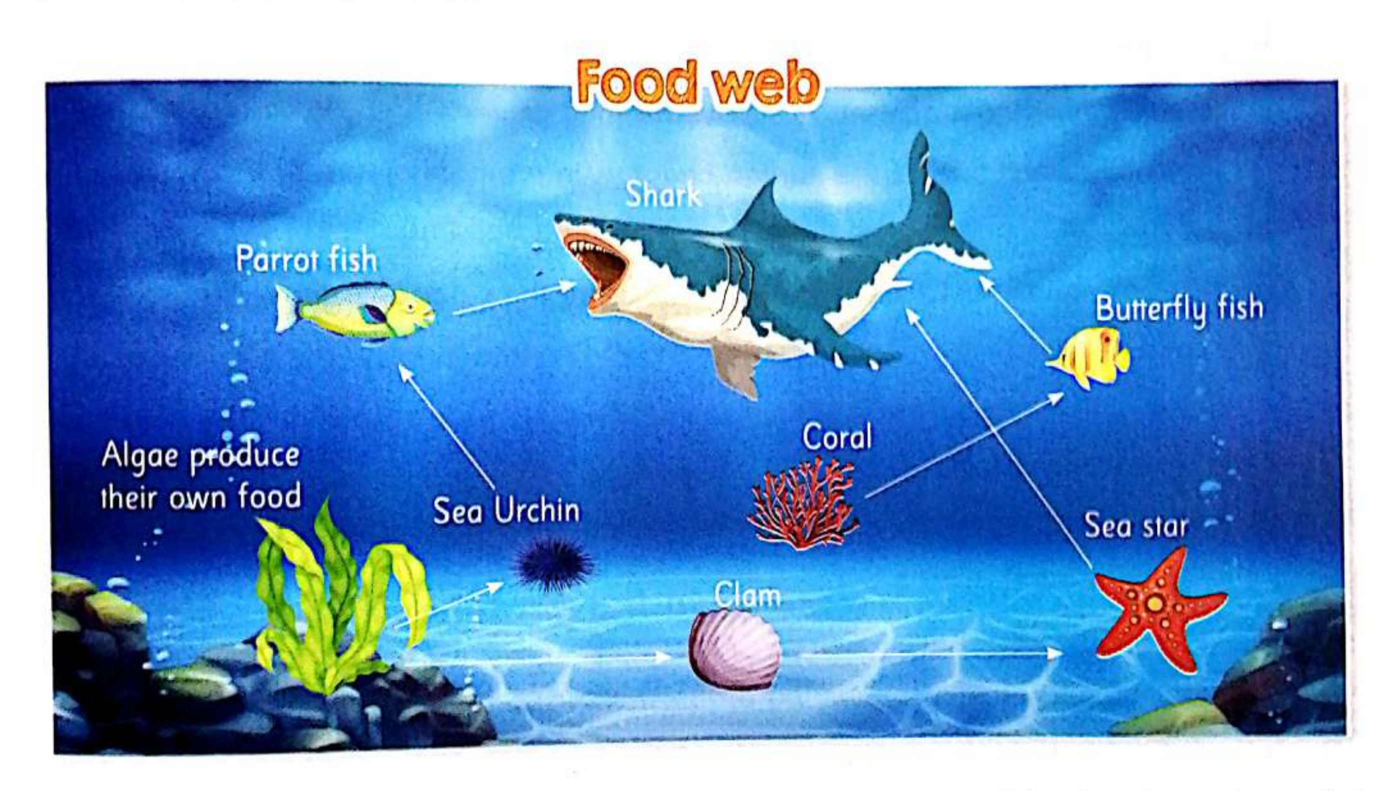
Lesson 5



11 Activity Impact on a food Web

- Coral is an **important component** of many ocean food webs.
- Coral is considered as **a food** for a variety of primary consumers.
- Many organisms in the ocean use the coral as **a shelter**.
- The loss of coral reefs has a **destructive impact** on the ocean ecosystem.

Look at the following figure that represents a coral reef food web, then answer the given questions.



1. Algae is the **(producer – consumer)** organism in the coral reef food web, while starfish is a **(producer – consumer)** organism.
2. Butterfly fish feeds on **(coral – sea star)**, while parrot fish is eaten by **(shark – clam)**.
3. If the coral reef disappears from the food web, the organisms that depend on it for food and shelter will **(survive – die)**.

Parents' Tips

Help your child solve this activity to ensure his/her understanding of the importance of coral reefs in the ocean food web.





Learn Exercise 2



1 Choose the correct answer:

1. .... are among the factors which increase the population number of species in an area.
   a. Suitable climate changes
   b. Migration of living organisms
   c. Increasing the reproduction rate
   d. Both (a) and (c)
2. Habitat loss causes ....
   a. increasing the number of living organisms
   b. disappearing of living organisms from the ecosystem
   c. the ability of living organisms to survive for long time
   d. No correct answer
3. All the following are from the human changes in the habitat except ....
   a. making roads
   b. adding buildings
   c. changing the temperature
   d. using the solar energy
4. The coral reefs provide .... for small fish in oceans.
   a. air
   b. food
   c. shelter
   d. Both (b) and (c)
5. Coral bleaching affects .... negatively.
   a. human
   b. fish
   c. coral
   d. All the previous answers

2 Complete the following sentences using words between brackets:

1. Pollution affects .... living organisms in food web. (all – some)
2. It is preferable to use containers made of .... to protect the marine habitat. (carton – plastic)
3. Organisms can survive in a/an .... environment. (healthy – unhealthy)
4. When the water temperature increases, coral loses its .... (color– shape)

3 Write the scientific term for each of the following:

1. It is the number of organisms of one type of species living in an area. (....................)
2. The destruction of habitats or their qualities that harms organisms. (....................)
3. They are small pieces produced from the broken down plastic products. (....................)
4. Changing the color of coral reefs into white. (....................)



SHARE



Lesson 6



Record Evidence: Protecting Ecosystems

- You have learned about changes in food webs.
- Now, you can write a scientific explanation, act like a scientist and follow the scientific method.
- Answer the "**Question**" from "**Can You Explain**" activity, then share what you have learned with your classmates.



Question:

What might happen to a food web when an organism or the environment changes within an ecosystem?

Claim:

All organisms may be affected by a change in a food web.

Evidence:

- All organisms play an important role in keeping the community in balance.
- When we modeled the transfer of energy in the energy flow activity, we saw that a small percentage of energy had passed with each interaction.
- When the ecosystem is exposed to pollution and other changes, the whole food web falls apart.
- When we looked at a desert food web, we found that if the grass (producers) was removed, even eagles that do not eat grass would be affected.
- When coral reefs are exposed to pollution, it can cause ecosystem collapse.

Scientific Explanation:

- If there is a change in an ecosystem, all organisms may be affected. If there are no producers, the consumers will have to move or will die.
- If there are too many of one species, the resources may disappear. When this happens, other species may lose their food source and will not be able to survive.
- The organisms that live in the affected community may not be able to adjust to the new surroundings.
- When those organisms are no longer there, other populations may also decline.
- Everything in an ecosystem is connected.

Parents' Tips

Help your child return to the investigative phenomenon and write a scientific explanation with evidence.



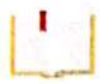




13 Activity: Habitat Restoration

- Although human activities can negatively impact the environment, there are strategies that successfully restore habitats.

Habitat Restoration



Habitat Restoration

It is the restoring of the land and water to how they had been before harm.

- Habitat restoration projects help to prevent species from going extinct by restoring the habitat to the way it was before it was damaged.



Restoration projects include

- Bringing back food and water resources
- Recovering shelter and space





Note: Most projects need a lot of work and take a long time, but they can have very positive results.

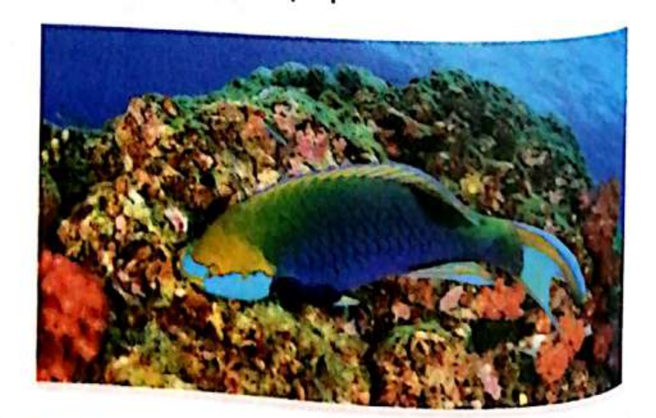
What will happen if the habitat is not restored



- Species may be lost, which leads to a decline in the number of populations.

Examples:

If the coral disappears, the parrot fish number will decrease.



Parents' Tips

Help your child recognize that there are strategies that successfully help in restoring habitats.

Restoration







Rebuilding Coral Reefs

- One example of restoring habitat is the coral reef rehabilitation project happening in the Arabian Gulf.

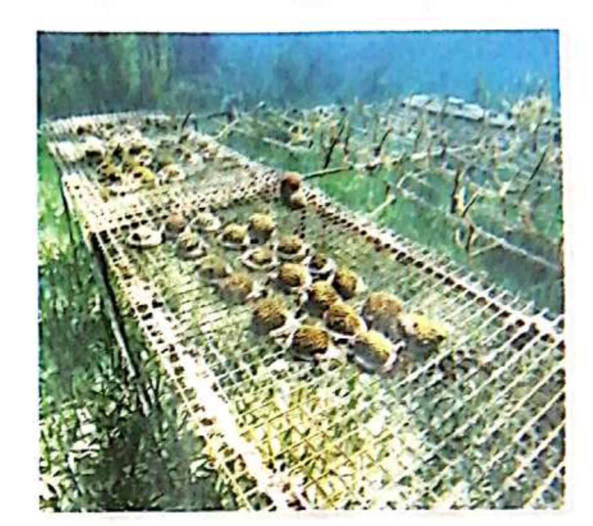
How does rebuilding coral reefs work 

1. Scientists are harvesting small fragments of various coral species and moving them to a nursery.



Nursery

It is an area in the ocean where the small pieces of coral are nurtured until they can be moved back to the reefs where they were dying.



2. Then the healthy coral can continue growing and reproducing to make thriving reef again.



These scientists in the Arabian Gulf also conduct research and study the best coral species to use for future restoration projects.



Protecting Reefs from Plastic Pollution:

- Local people hope to decrease the amount of pollution in the ocean.
- In some coastal communities near the reefs (such as in Egypt) they have adapted a zero plastic way of life.

What are the ways of protecting reefs from plastic pollution 

1. Replacing plastic forks with wooden ones.
2. Converting plastic grocery bags into cloth.

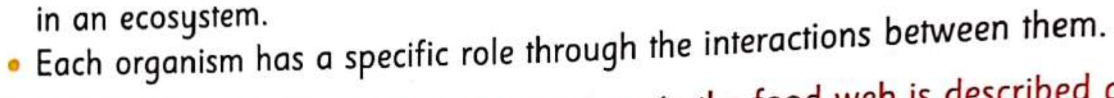
Nursery المشتل | Local المحليين



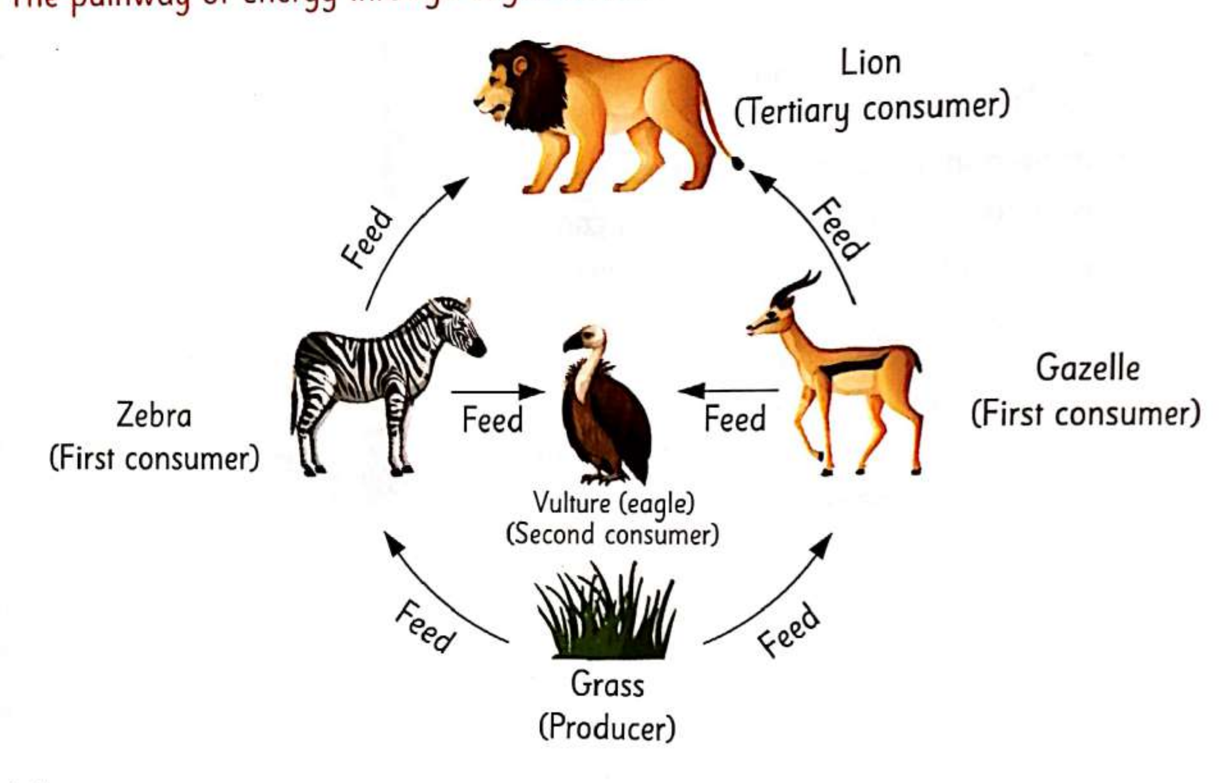




Concept Main Ideas



- Food webs describe the relationships or connections between species in an ecosystem.
- Each organism has a specific role through the interactions between them.
- The pathway of energy through organisms in the food web is described as follows:



- Although energy is transferred between living organisms, most of the energy is recycled by decomposer back into the ecosystem.

So, The energy in the ecosystem remains the same.

- Any change in the ecosystem affects the food web and may cause the missing of some organisms, such as:

1. The changing amount of rain.
2. Drought
3. Increasing the number of predators
4. Human activities **such as:**
   - a. Water, air and soil pollution.
   - b. Overfishing.
   - c. Throwing plastic products into water.
   - d. Eroding the land.
   - e. Changing the weather such as increasing or decreasing the temperature.



Parents' Tips

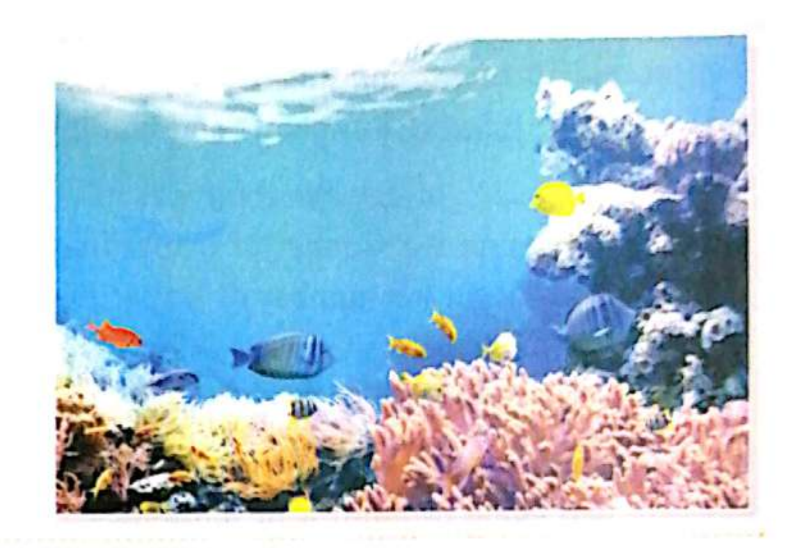
Help your child summarize his/her knowledge about changes in food webs.

All the previous changes are causing destruction to the ecosystem and habitat loss.

- Also the marine habitats are affected by throwing large quantities of plastic in water which are eaten by the marine organisms.
- Population changes occur as a result of changes in the ecosystem as producers will disappear and consumers will move to another place or will die.

Coral reefs

- They are the habitats and the source of food for many living organisms.
- When coral reefs disappear, the fish communities that depend on corals to get their food will be affected.



Coral reefs are very important as:

1. They support large numbers of species with food and shelter.
2. They are also important for tourism as people travel to coral reefs for fishing or diving.
3. They ingest the microplastics by filtering the ocean water to get food.

Ways to protect ecosystem:

1. Prevent overfishing in marine environments.
2. Decrease land activities such as adding buildings and making roads.
3. Stop throwing plastic products into the water.
4. Stop using pollutants.
5. Recycle plastic products.

Once harm has been done to the environment, scientists, engineers, and concerned citizens work on Habitat restoration.







1 Choose the correct answer:

1. What does a food chain represent?
   a. How producers use sunlight to make food.
   b. Where resources are found in a habitat.
   c. How living organisms depend on each other to get their food.
   d. The broken down plants and animals' remains.

2. .... affects the food web.
   a. Increasing the number of a specific species
   b. Decreasing the number of a specific species
   c. The death of a specific species
   d. All the previous answers

3. Interdependence between living organisms means ....
   a. two living organisms or more depend on each other to get their food
   b. one organism kills another organism
   c. there is no relation between living organisms
   d. No correct answer

4. Overfishing causes ....
   a. a decrease in the number of various species in marine habitats
   b. a negative effect on food web in oceans
   c. moving away of some organisms to other regions
   d. All the previous answers.

5. Invasive species .... the ecosystem.
   a. harm b. benefit c. balance d. increase

6. Overfishing causes problems in marine ecosystems including increasing the number of algae. This increase in algae happens because ....
   a. fishing allows more light to reach producers
   b. the reproduction of fish prevents the growth of algae
   c. fishermen provide energy to producers
   d. fish that consume algae are removed

7. A frog eats a fly. So, the frog and fly are considered ....
   a. producer and consumer
   b. predator and prey
   c. consumer and decomposer
   d. No correct answer



8. Drought causes the death of ....

   a. grass only
   b. animals only
   c. grass and animals
   d. No correct answer.

9. Which of the following is the producer in this ecosystem?

   a. Humpback.
   b. Sea turtle.
   c. Phytoplankton.
   d. Sharks.

phytoplankton
Krill
Humpback whales
Herring
Jellyfish
Puffins
Codfish
Sea turtles
Sharks

10. What might happen if the primary consumer was removed from an ecosystem?

    a. There would be more food for secondary consumers.
    b. The number of plants would decrease.
    c. The number of plants would increase.
    d. The number of secondary consumers would increase.

11. What do arrows in a food web represent?

    a. They point to the organism that is being eaten.
    b. They show how sunlight flows within an ecosystem.
    c. They show the direction of energy flowing between organisms.
    d. They show the flowing of water within the habitat.

12. Which of the following human activities causes the greatest destruction to the environment?

    a. Replanting trees.
    b. Recycling cardboard boxes.
    c. Burning fossil fuels.
    d. Using solar energy.

13. The main source of energy for all living organisms on Earth is the ....

    a. land
    b. plants
    c. water
    d. sun

14. .... are the factors which decrease the population number of species in an area.

    a. Suitable climate changes
    b. Migration of living-organisms
    c. Unsuitable climate changes
    d. Both (b) and (c)

15. Colored coral is an example of a/an .... habitat.

    a. healthy
    b. dying
    c. unhealthy
    d. hot



16. Why are microplastics harmful?
    a. Because they are small enough to be eaten by a marine organisms.
    b. Because they stay in the ocean for long time.
    c. Because they kill marine animals. d. No correct answer.

2 Complete the following sentences using words between brackets:

1. Preventing fishermen from overfishing .... the ecosystem. (protects – harm
2. Throwing plastic in water is one of the .... impacts of human activities. (positive – negativ
3. .... has a bad effect on ecosystem. (Drought – Recyclin
4. Heavy rain .... the desert habitat. (develops – destroy
5. Food web shows the .... relationship between organisms in an ecosystem (reproduction – feedin
6. There's plenty of food in the .... habitat. (healthy – destroyed
7. The real food of sea turtle is .... (plastic – jellyfish
8. Recycling .... the plastic in the marine habitat. (reduces – increases

3 Put (✓) or (✗) in front of each sentence:

1. Human activities don't affect marine habitats. (
2. Overfishing protects the environment. (
3. Invasive species decrease the number of marine animals. (
4. In food web, the energy transfers from primary consumer to producer. (
5. Only human activities in water affect marine habitats. (
6. Environmental changes in ecosystem affect the food web. (
7. The relationships between living organisms cause the balancing of ecosystem. (
8. Drought affects the ecosystem. (
9. In food web, all energy is transferred from one organism to another while feeding on it. (
10. Overpopulation of a specific organism causes lack of its food. (
11. Corals die after losing their colors. (



12. Coral bleaching has a positive impact on coral reefs. ( )
13. Coral is considered as a food for a variety of primary and secondary consumers. ( )
14. Healthy habitat has a lack of food. ( )
15. Plastic is a nutritious material for marine animals. ( )

4 Write the scientific term for each of the following:

1. Loss of animals from the ecosystem. (..............................)
2. Any increase or decrease in the population number of a species. (..............................)
3. They help in the breaking down of plastic products. (..............................)
4. They support the organisms in oceans with food and shelter. (..............................)
5. They filter the ocean water to get food. (..............................)

5 Match from column (B) what suits in column (A):

A	B
1. Adding buildings to a habitat	a. It takes protected marine environment programs.
2. Foxes and lions	b. Cannot differentiate between plastic and their food.
3. Palau island	c. Causes habitat loss.
4. Coral reefs	d. From the top predators in the food web.
5. Sea turtles	e. Attract people to visit them.

6 Answer the following questions:

1. **Mention the reason:** Why does heavy rain destroy the desert habitat?

....

2. **Look at the opposite diagram, then answer.**
Which of the following has long-term result of reducing the herring population in this ecosystem?
a. An increase in the puffin population.
b. A decrease in the shark population.
c. An increase in the codfish population.
d. A decrease in the humpback whale population.



3. What are the basic needs of living organisms?

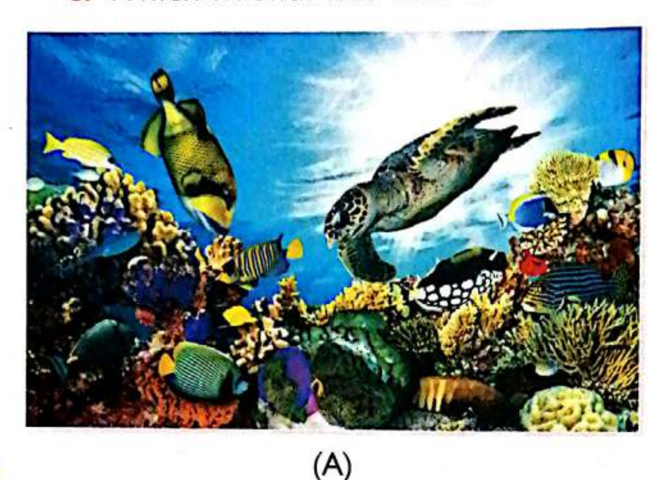
....

4. **Look at the following figures, then answer:**

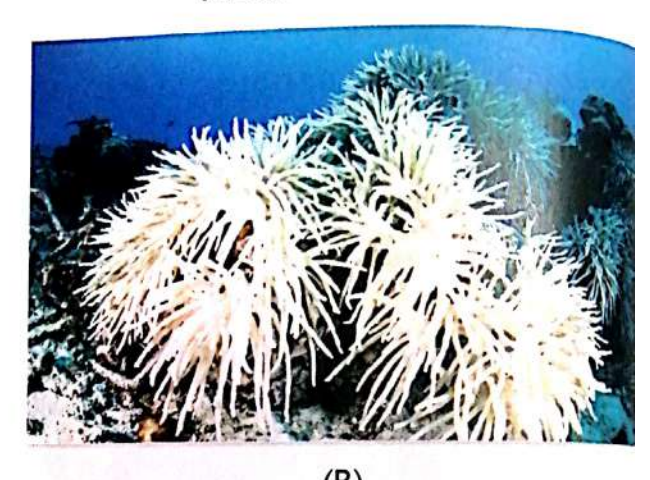
   a. Which figure represents healthy habitat? (..............................)

   b. Which figure represents unhealthy habitat? (..............................)

   c. Which habitat has lack of food? (..............................)



(A)



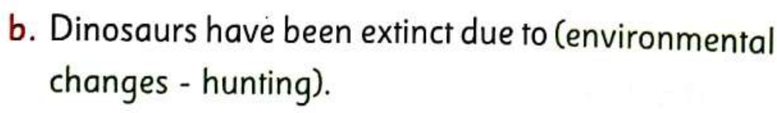
(B)

5. **Look at the opposite figure, read the text, then circle the correct answer:**



   a. Dinosaurs have been extinct for millions of years. Scientists who have studied fossils of dinosaurs are certain that they were meat eaters, they knew this because they found (sharp teeth - long tails) in their fossils.

   b. Dinosaurs have been extinct due to (environmental changes - hunting).



6. **Look at the opposite figure, read the text, then circle the correct answer:**



   a. There are fewer animals in the desert than in a rain forest, because there are fewer (predators - preys) being eaten.

   b. Also there is very few prey in the desert, because there aren't many (plants - animals).



1 Choose the correct answer:

1. Cactus is a .... in the desert food web.
   a. producer b. consumer c. predator d. decomposer
2. All the following represent the importance of coral reefs except ....
   a. they are the habitats for many living organisms
   b. attracting tourists
   c. producing energy
   d. absorbing microplastics in water
3. All the following cause habitat loss except ....
   a. throwing wastes in water b. changing temperature
   c. replanting trees d. overfishing
4. What happens when you continue to pollute the air and water? ....
   a. Infection of humans with diseases b. Death of some plants
   c. Extinction of some animals d. All the previous answers.
5. Which of the following would be a result of increasing the krill population in this ecosystem?
   a. A reduction in the humpback whale population.
   b. An increase in the jellyfish population.
   c. A decrease in the herring population.
   d. An increase in the phytoplankton population.

2 Put (✓) or (✗) in front of each sentence:

1. Plastic products have a feeding benefit for marine animals. (   )
2. The cold water destroys coral reefs. (   )
3. When coral reefs get rid of algae that exists in their tissues, they become red. (   )
4. Coral bleaching affects human communities. (   )

3 Write the scientific term for each of the following:

1. It represents the feeding relationships between organisms. (....................)
2. They return back the amount of nutrients to the ecosystem. (....................)
3. They are very small particles that result from the breaking down of plastic products. (....................)

4 Answer the following:

What would happen if all algae are removed from the ocean food web? ....

Assess Your Progress ★★★★★

< 50%	50 : 64%	65 : 84%	85 : 100%
Study again.	Practice more.	Solve more exams.	Well done!

Projects

Unit One Project

Build a Miniature Ecosystem

"All living things need energy to stay alive..."

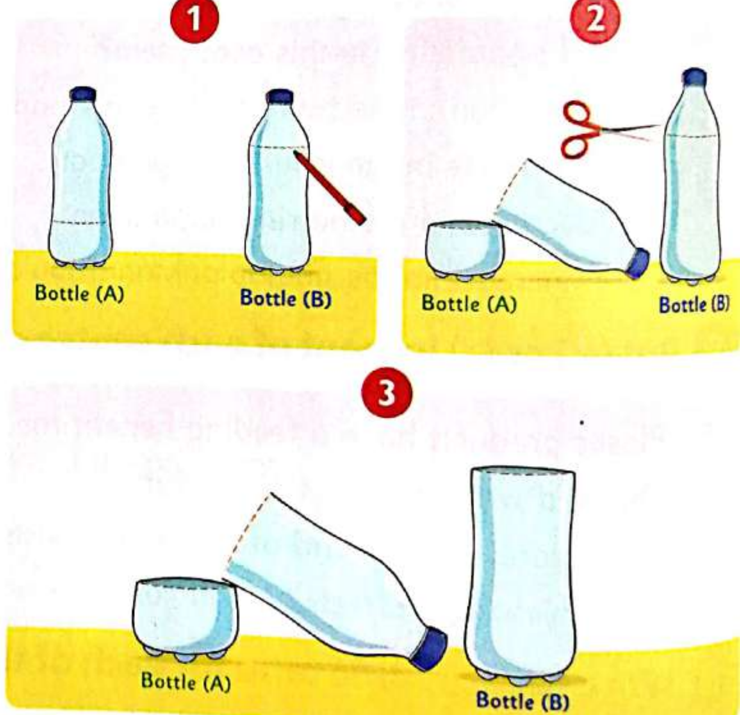
Thinking about the different types of organisms that are found in a healthy ecosystem. And considering how they depend on the other living organisms in the community.

Let's use what we have learned about the components of a food web and the interactions that organisms have within their environment, to build a "Miniature Ecosystem" ...

(A) Constructing a simple "Miniature Ecosystem"

Preparation:

- Each group of students should have:
  - 2 large empty plastic bottles (such as those that have water in them).
  - A marker.
  - A pair of scissors.
- Clean the bottles with soap and water, then rinse them thoroughly, so that no residue remains.
- Use the marker to make lines for cutting each bottle.
- Each bottle should be cut at once.
- Retain both parts of Bottle (A), and the lower part of Bottle (B).
- Bottle (A) will serve as Terrarium (terrestrial) and Bottle (B) will serve as Aquarium.



Planning:

- On a large piece of paper, plan using diagrams and labels how you might build a mini-ecosystem in this container (Note: consider that the main components of an ecosystem are: non-living things, producers, consumers, and decomposers).



Construction:

- On the first day of construction, set up the non-living materials and introduce the plants that will form the base of the food chain in your mini-ecosystem model.
- **Bottle (B) "Aquatic environment":**
  - At the bottom of the bottle (B), place shallow layer of rinsed gravel.
  - Pour distilled water into the bottle (leaving a room for Bottle A to be inverted at the top).
  - Place plants in the water, or root them in the gravel.
  - Put a very small plant-eating fish and a snail.



Bottle (B)
Aquarium

Think!!

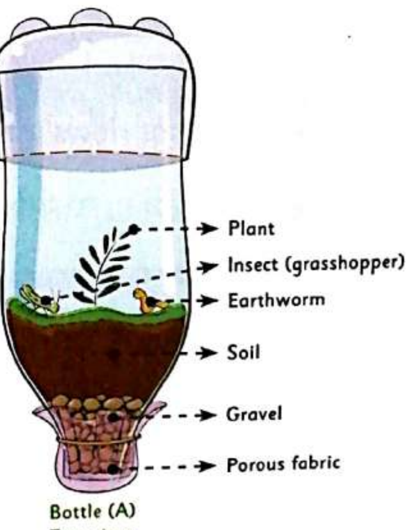
- **From the "Aquatic environment" components, is/are the...**

Non-living things: .... Producer: ....

Consumer: .... Decomposer: ....

Bottle (A) "Terrarium environment":

- Remove the lid from bottle (A), place a piece of a porous fabric over the opening and secure it with a rubber band.
- Place a layer of gravel.
- Place a layer of soil on the top of the gravel.
- Put small plants in the soil.
- Poke some holes in the cut-off bottom of bottle (A).



Bottle (A)
Terrarium

Think!!

- **From the "Terrarium environment" components, is/are the...**

Non-living things: .... Producer: ....

Consumer: .... Decomposer: ....

(B) Modeling the Flow of Energy



Complete Miniature Ecosystem

Modeling:

- Invert bottle (A) into bottle (B), where the water in bottle (B) should cover the opening of bottle (A) without spilling over the sides.
- Secure the entire column with strong tape and place it in indirect sunlight.



- **In an ecosystem, from where the energy flow begins?**

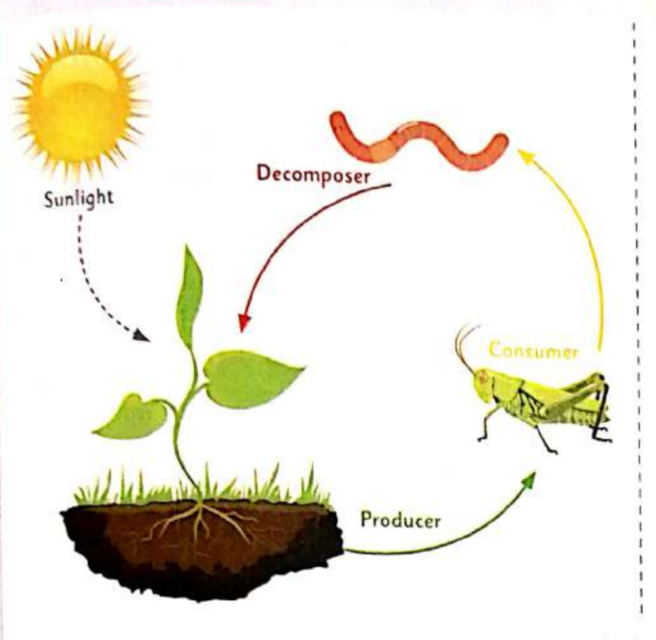
☐ Producers ☐ Consumers

☐ Sunlight ☐ Decomposers

- Think how the energy flows through this ecosystem of the constructed environments. Draw 2 Food Chains diagrams, with respect to the sequence of energy that flows through the ecosystems. Diagrams should include labels starting from the Sun, to the "Producers" (plants), "Consumers" (small animals that eat plants), and "Decomposers" (animals that eat dead organisms).

Modeling the Energy transfer

Terrarium Model



Aquarium Model

Sketch your Design

Observation:

- Monitor the progress of the 2 mini-ecosystems, continue making observations of changes in the systems over time.
- Once the project is no longer in use, uninstall the bottles, recycle them and place the living things back in their suitable environments.

Understanding relationships:

- Food chain diagrams represent Energy Flow in the mini-ecosystems.
- We first develop the models by identifying the types of living things that interact with each other in the ecosystem.
- The initial source of energy in an ecosystem is the "Sunlight" (radiant energy).
- When the Radiant energy transfers ⟶ to the Producers (plants) ⟶ to the Consumers, where energy flows between one organism to another ⟶ to the Decomposers where the energy is recycled back into the ecosystem to end the model ⟶ back to the plants.

Interdisciplinary Project

Waste Not, Want Not

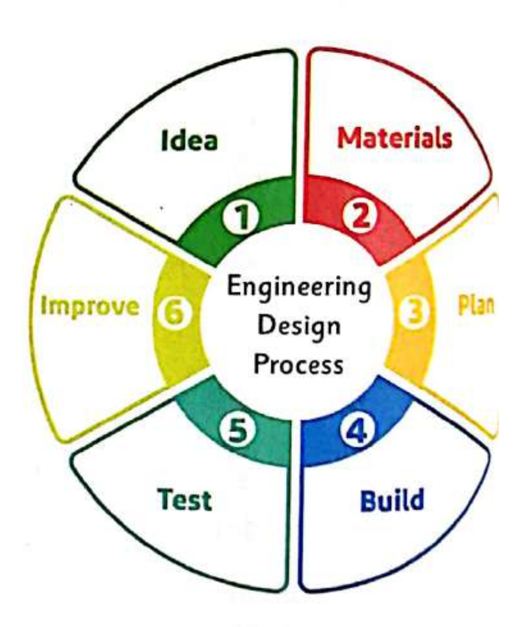


Follow the given instructions to help you make your interdisciplinary project:

In this project you will...



- Use your Science, Mathematics, Social Studies and Writing skills to find a solution to a real-world problem.
- You will begin by reading the given fictional story about a group of "STEM Solution Seekers".
- You will study some background information, and you will go through the steps of the "Engineering Design Process".
- You will also do some additional work in your Mathematics class related to this challenge.



This project will change you to ...

- Think about the problem of plastic pollution, especially in WATERWAYS.
- Consider ways to repurpose plastic and materials otherwise considered trash.



Waste Not, Want Not

Think!! **"Pollution in Egyptian waterways"**

- **How often do you use plastics in your daily routine?**

☐ Rarely ☐ A lot ☐ Never

- **After using these plastics, what happens to them or where do they go?**

☐ I throw them in the recycling bins.

☐ I reuse them (Ex: plastic bags and bottles).

☐ I throw them anywhere (water, gardens, streets).

Read and Think:

- A group of friends (fictional STEM Solution Seekers) were presenting a project at the National Science fair at "Sinai".
- During their lunch along Suez's famous canal, they noticed that there are a lot of floating stuff along the shore.

Think!!

- **Have you ever been somewhere and noticed plastic bags and bottles in the water?**

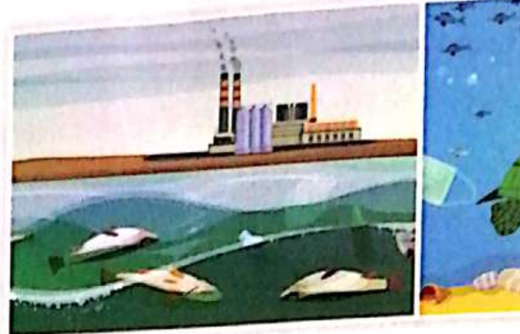
☐ Yes ☐ No

- They kept wondering **"Are these some kind of seaweeds?"** or **Wastes?"** but "Sara" one of the group members, said that they didn't look like seaweed to me, as they had different colors, they were probably plastic and other kinds of trash.
- While "Fady" who is from Suez replied, that Suez is facing a BIG problem, as it is growing and growing, but they can't keep up with all the trash.

Think!!

- **What is the effect of having plastic in waterways?**

☐ Safe ☐ Harmful




- One of the kids, parents continued, that Peru and the Pacific are also full of plastic wastes too, specially down near the ocean, where these wastes "**kill all kinds of marine life**", as the fish eat plastic (look like food), and other sea creatures get tangled up in the trash. Imagine!! there is a huge island of plastic in the middle of the Pacific Ocean.
- Dahlia followed, there is a group in the Science fair, who presented such an amazing idea "**Trash-eating Sea Drain**", but she is not sure if this is enough to get rid of everything as it already works on the stuffs in the water.



- **Do you think that people need to do more to keep trash from getting into the ocean?**

☐ Yes ☐ No

- We produce tons and tons of trash every day, so we need to find ways to cut down on what we use and throw away, as too much of it ends up in streets and waterways.
- Plastic materials do not decompose like other materials do. Plastics are here forever!!
- There are ways to reuse, recycle, and reduce some of these wastes.

Reuse

- Plastic materials do not decompose like other materials do.
- There are ways to reuse some of that plastic.

Recycle

- We can melt down plastic and make other things with it.

Reduce

- We also need to produce less plastic.
- We can use paper and wood instead.



Engineering Solution

1 Identify the Challenge



"To design and build something new that you and your classmates can make with plastic bags or bottles into new design".

Consider something helpful, that you need every day.

2 Objectives

- Review the Challenge requirements and needs of the repurposed plastic design.
- Assign group members roles.
- Sketch 3-4 brainstorming ideas.
- Decide one final design for your prototype (model or sample).
- Create the prototype of your solution that helps in repurposing plastic bags and bottles into new design.
- Reflect (or review) and present your product and your process.

Let's Begin...

3 Design Requirements:

☐ Diagram ☐ Prototype ☐ Presentation (sharing the product and the process)

4 Assign the Group Roles:

Job	Team Captain	Materials Manager	Engineer	Team Reporter
Role	• Encourages and supports the team. • Helps team members and keeps track of timeline.	• Gathers and organizes materials.	• Coordinates the team in building the model safely. • Decides when testing is needed.	• Records the steps of the process. • Shares the process.
Member Name	....	....	....	....

5 Sketching design

Sketch 1



Sketch 2

Sketch your Design

Sketch 3

Sketch your Design

6 Engineering Design Process

1 Idea

- Think about and imagine ideas that might help you turn plastic bottles or plastic bag into something new.
- Sketch different ideas for repurposing plastic bags or bottles.
- Decide which design fits the requirements of the project.

2 Materials

- Plastic bottles or plastic bags.
- Pencils.
- Building materials, such as tape, glue, string. or construction paper.

Optional:

- Digital camera or Digital video camera.

3 Plan

- Gather the materials.
- Use the chosen sketch to create a separate diagram with additional details to be used as a blueprint for your prototype.

4 Build

- With the Chief Engineer, start building your prototype.

5 Test

- Once your prototype is complete, the chief engineer will start testing the process to know whether the model is working perfectly or it needs improvements.

6 Improve

- If your prototype testing results showed that it needs any improvement, go ahead and start working on the reported issue.

Friendly Advice!!

- Do not panic when you run into problems or challenges, just focus on one problem at a time, then use your creativity and collaborative skills to find solutions to continue your building process.
- Engineers document problems to troubleshoot when things go wrong so they can look for places to make improvements.



Analysis & Conclusions

Sketch 1

- What was your role in the team?

I was Materials manager.

- Did your design meet the requirements?

☑ Yes ☐ No

- How did you know your design has turned a plastic bottle or bag into something new?

I used the plastic bottle to create eco-friendly decorative plant's pots.

- In case your group design needs improvement, what would you improve?

I would add to the plant's pot a suitable isolating cover and watering source, to offer it a suitable environment that meets the plant's need to survive in its environment.

Analysis & Conclusions

Sketch ...

- What was your role in the team?

....

- Did your design meet the requirements/needs?

☐ Yes ☐ No

- How did you know that your design was successful?

How did you (or Chief engineer member) test it?

....

....

....

- In case your group design needs improvement, what would you improve?

....



Particles in Motion

Unit Overview

In this unit:

- Students classify materials by state and learn how the characteristics of the particles in each form behave.
- Students build models to represent the arrangement and movement of particles.
- Students understand why solids, liquids, and gases behave differently and practice the scientific skills of describing matter according to its properties.
- Students explore the effects of temperature, physical and chemical changes.



Get Started

What I Already Know

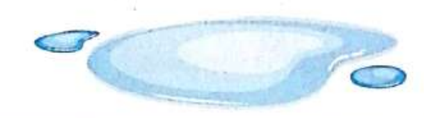
- Most matter on Earth is found in three states: solid, liquid, and gas.

STATES OF MATTER

Solid



Liquid



Gas



During this unit, we will...

- Learn that matter is composed of very small particles.
- Identify specific ways to describe, and measure the different states of matter.
- Learn that matter can change physically as well as chemically.

Anchor Phenomenon

Sands of Time:



- You probably know a lot about sand. Now, picture how sand changes when it mixes with water, such as at the seashore.
- Sometimes, people use sand to keep track of time.
- An hourglass is a tool that holds the sand in one compartment.
- When the hourglass is set on one end, the sand runs from the top section into the bottom.

Write some questions you can ask to learn more about how sand behaves, what state of matter sand is, and how the properties of sand can be manipulated for practical application purposes.

Unit Project Preview

Slippery Sands

- In this project, we will describe the properties of sand, including its state of matter, and explain how it was used in creating the ancient Pyramids.





Matter in the World Around Us



Concept Objectives

By the end of this concept, the student will be able to:

- Communicate the defining characteristics of the three states of matter.
- Explain how the changes in the states of matter result in changes to the organization and movement of the particles within matter.
- Develop models of matter that describe extremely small particles and extremely large quantities of particles in different states.



WONDER



Lesson 1



Can You Explain?

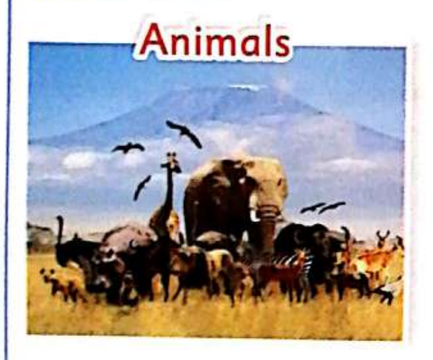
- In our environment, everything around us that we can see or touch is made up of matter, including us.

Matter

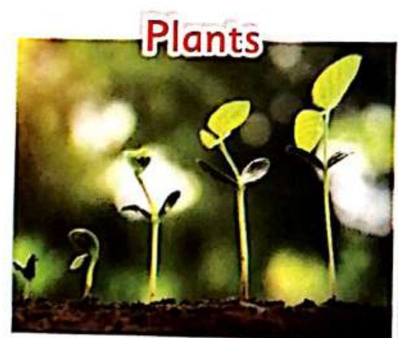
- Matter can exist in different states (or forms), each state has its own properties.
- Matter occupies space wherever it exists.

Examples:

Animals



Plants







Water



Air



What are the different forms of matter that can be found in the world around us



- Matter can be found in the form of "Solid", "Liquid" or "Gas".
- In this concept, we will learn the states of matter, their definitive properties, and the unique arrangement and movement of their particles.

Parents' Tips

Help your child remember the types of matter that he/she has previously learned.

Matter	المادة	Solid	صلب
Liquid	سائل	Gas	غاز





- Are all states (forms) of matter of the same object look alike?

Yes ☐ No ☐

Three States of Matter

Let's identify the different states of water ...



What is common between the three images?

They are all water.





What is the difference between the three images?

They look different in state. (physically).

- Water exists in three different states: "Solid" as ice cubes, "Liquid" as water and "Gas" as water vapor (or steam), where each state has its unique characteristics.



- Steam is the gaseous form of water.

Ex. The steam (vapor) is released from a cooking pot.



Search the internet

- How does water change physically and can ice cubes or steam change back into their previous form?

Parents' Tips

Help your child observe the differences and similarities between the three pictures.

Steam	بخار	States	حالات
Gaseous form	حالة غازية	Physically	فيزيائية





- Do you think the three states of matter have the same characteristics?

Yes ☐ No ☐

Describing Matter

- Matter is described through its unique properties or characteristics such as:

Properties of Matter

Color
Matter has different colors, such as:
Black, white, or even colorless.

Shape
Matter has different shapes such as round (like a ball), or square (like a brick), etc.

Hardness
Matter is either hard like a brick, or soft like a feather and cotton.

Size
Matter has different sizes; it might be too small (unseen) or even bigger than the Earth.

Temperature
Matter has different temperatures, such as:
hot (like a cup of tea) or cold (like soda drinks).

- The differences in the way we describe matter help us define the properties of vari states of matter.

Checkpoint

Put (✓) or (X) in front of each sentence:

1. The three states of matter have the same properties. ( )
2. The three states of matter have constant temperature. ( )
3. Steam is the liquid form of water. ( )

4 Digital Extension Activity

What do you already know about matter in the world around us?

- For more knowledge about the matter (objects) that exist in our world, use the Egyptian Knowledge Bank.

Egyptian Knowledge Bank
بنك المعرفة المصرى
https://study.ekb.eg

Parents' Tips
Discuss the different properties of matter with your child.



Properties
Hardness





Lesson 2

5 Activity Hands-On Investigation: Observing Matter

- Is there any common property between the states of matter?

Yes ☐ No ☐





Classifying Objects

- In this experiment, we will examine samples of solids, liquids, and gases, and identify their properties.

Caution!! Follow the lab safety guidelines while performing an experiment.

Experiment

Aim: Determine the characteristics of "Solids", "Liquids", and "Gases".

Materials: A brick in container (A) – Oil in container (B) – Air in container (C).

Steps	Illustration
1 Look inside container (A) and observe the properties of the object inside. 2 Record your observations for container (A), regarding "color, size, shape and texture". 3 Decide if the object inside container (A) is a "Solid", "Liquid" or "Gas". 4 Repeat the previous steps with containers (B) and (C).	(A) Brick (B) Oil (C) Air "inside the balloon"

Observation:

Container	Color	Does it take up space?	Shape	Texture	Is it Solid, Liquid, or Gas?
(A) "Brick"	Brown	☑ Yes ☐ No	Definite shape	Hard	Solid
(B) "Oil"	Yellow	☑ Yes ☐ No	Indefinite shape	Wet	Liquid
(C) "Air"	Colorless (inside the balloon)	☑ Yes ☐ No	Indefinite shape	Smooth	Gas

Parents' Tips

Provide your child with different types of matter and let him/her identify the properties of each.



Conclusion:

- Objects differ from each other in terms of color, shape, size and physical state (solid, liquid, gas).
- Solids take up space and have definite shape and different textures.
- Liquids take up space, have indefinite shape, and take the shape of the container in which it is placed.
- Gases take up space all around us, have indefinite shape, and they are invisible.



- Solids and liquids are alike, as they take up space.
- Although gas is invisible, air can be seen when the wind blows the objects around us or when we blow air into a balloon.

Challenge

- Describe the properties of one or two objects at your home/or class (Color, Size, Shape, Texture), to identify the state of matter of this object; then share your observations with your classmates.

Checkpoint

Circle the properties of each object, then classify them into "Solid, Liquid or Gas":

1-
- Wet
- Hard
- Definite shape
- Indefinite shape
- Takes up space
- Does not take up space

▸ Juice is a (Solid – Liquid – Gas).

2-
- Soft
- Hard
- Definite shape
- Indefinite shape
- Takes up space
- Does not take up space

▸ Fork is a (Solid – Liquid – Gas).

Container	إناء	Take up	تأخذ
Indefinite	غير ثابت/ غير محدد	Smooth	ناعم
Definite	ثابت/محدد		





- Which of the following is not considered a kind of matter?

Light ☐ Wood ☐ Water ☐

What is Matter?



- Anything that has mass and takes up space is considered a kind of matter; such as air, water, tables, mountains, juice, animals, human, and plants.

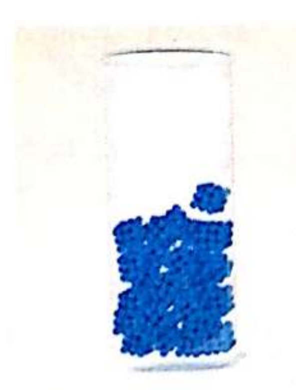


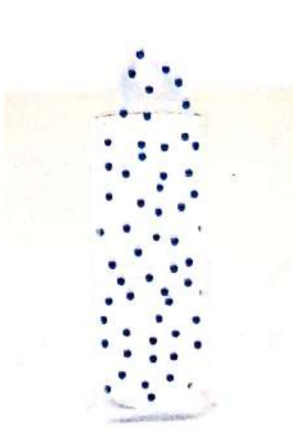
Matter

It is anything that has mass and takes up space.

Motion of Particles

- Matter is made up of tiny particles that are in continuous motion.
- The motion of particles determines the state of matter, as shown:





Solid
- Particles are packed tightly together.
- They have the least energy.
- They move a little bit.

Liquid
- Particles have more space.
- They have more energy.
- They move more freely.

Gas
- Particles have a lot of space.
- They have a lot of energy.
- They move very freely.

Parents' Tips

Help your child understand that matter is made of moving particles, and the motion of these particles determines the state of matter.

Mass	كتلة	Particles	جسيمات
Space	حيز/فراغ	Packed tightly	متقاربة





- Light and sound are not matter, both of them are considered forms of energy.
- Matter can change from one state to another, such as ice melts into water.

Measuring & Observing Matter

- Matter can be measured and observed in different ways.

Examples:



- Measuring how tall we are using meterstick or measuring tape.



- Measuring weights using a scale.



- Observing air filling up a balloon.



- Observing milk being poured into a glass and measuring its temperature using thermometer.

Checkpoint

Write the scientific term for each of the following:

1. A state of matter whose particles vibrate in place. (..................)
2. An invisible state of matter. (..................)
3. A tool used to measure temperature. (..................)
4. A state of matter that has a little space between its particles. (..................)
5. A state of matter that has a lot of energy. (..................)



Measuring tape	شريط قياس	Meterstick	عصا مترية	Weights	أوزان
Thermometer	ترمومتر	Poured	سكب		

Lesson 3



- Which of the following materials has a definite shape?

Air ☐ Wood ☐ Water ☐

How does Matter Behave?

- Matter can exist in three different states. Each one of the three states of matter has defining characteristics:

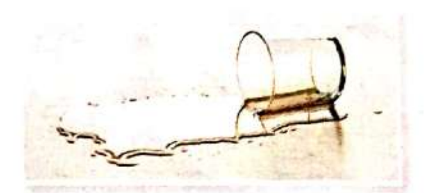
A Solids keep their shape unless an action is done to break or change them.







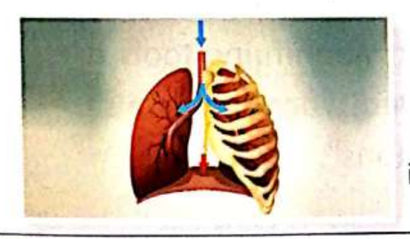
B Liquids can be poured, they do not have a shape of their own, but they take the shape of the container.







C Gases do not have shape of their own, but they completely fill a closed container, such as:



"Filling our lungs with air during inhalation process"



"Filling a tire tube with air"



- Matter in any state "Solid", "Liquid" or "Gas" occupies space.
- Any two objects can't take up the same space at the same time.



8 Digital Extension Activity

Three States of Matter

- For more knowledge about the three states of matter, use the Egyptian Knowledge Bank.



9 Digital Extension Activity



Egyptian Knowledge Bank
بنك المعرفة المصرى
https://study.ekb.eg/

What form is it?

- For more knowledge about how to predict the state of matter, use the Egyptian Knowledge Bank.

Parents' Tips

Help your child understand how each state of matter behaves according to its properties.

Inhalation استنشاق | Tire tube الإطارات







10 What is Matter?

Activity

- Do the particles in the three states of matter move alike? Yes ☐ No ☐

What is Matter Actually Made of?

- Matter is made up of millions of tiny particles that cannot be seen (invisible) with the naked eye.

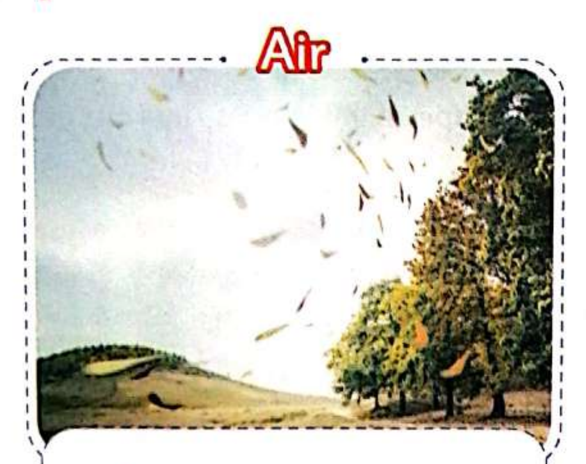


Particles

They are the building blocks of matter.

Examples:

Air



- "Air can be observed, when it blows objects around us".

Germs



- "Germs can be observed, under magnifying tools or detected when they cause infections".



Search the internet

- Why we cannot see the particles that make up matter individually with our naked eye?

Checkpoint

Put (✓) or (X) in front of each sentence:

1. In the three states of matter, tiny particles can be seen with naked eye. (   )
2. We fill the tire's tube with air. (   )
3. Particles cannot be seen individually with the naked eye. (   )
4. Liquids can be poured while solids can't. (   )
5. Matter is the building blocks of particles. (   )

Parents' Tips

Help your child understand the meaning of a particle.

Building block وحدة بناء | Germs الجراثيم









Particles of Matter

- We have previously learned that "Matter" is made up of tiny particles, while particles are invisible building units of matter.
- In your opinion, the particles that make up different objects are ....

different ☐ similar ☐

Particles of Matter

- The states of matter depend on the arrangement of particles in a substance.

What happens when we break down matter?



- When we break down a piece of gold (matter) into smaller and smaller pieces, these pieces would get too small to be seen (even through microscopes).
- It will end up with mostly small pieces of matter called "particles".





Different kinds of matter are made of different kinds of particles.

Let's observe different kinds of particles ...

1 Particles in Solids

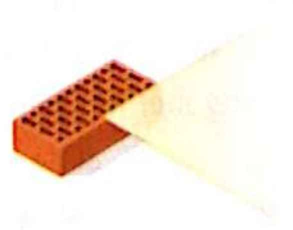
- In solids, particles...

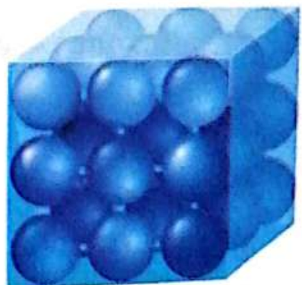
(A) Closely packed together in neat ordered arrangement.

(B) Cannot move/or slide past each other.

(C) Keep their shape.

(D) Vibrate, they are held together, so they don't move from place to place.





Parents' Tips

Help your child understand the different arrangement and motion of particles of objects, and identify different states of matter.



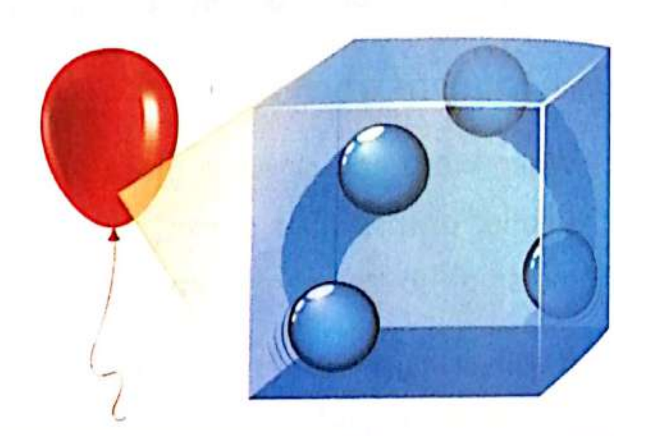


2 Particles in Liquids



- In liquids, particles...
  - (A) Are held together more loosely.
  - (B) Can move or slide past each other.
  - (C) Movement (sliding), helps liquids take the shape of their container.
  - (D) Move faster than in solids.

3 Particles in Gases



- In gases, particles...
  - (A) Are not held together.
  - (B) Can spread out freely, so they can fill any container.
  - (C) Move very quickly.



The liquid substance can be poured, while the solid substance cannot because liquids do not have a fixed shape, while solids have a fixed shape.

Checkpoint



Complete the following sentences using the given words:

(cannot – vibrate – liquids – gases – faster – quickly – Matter – can)

1. Particles in .... spread out freely.
2. .... is anything that has mass and takes up space.
3. Particles in solids, ... slide past each other.
4. Particles in liquids, ... slide past each other.
5. Particles of .... move .... than particles of solids.
6. Gaseous particles move ...., while solid particles ....



Closely packed متقاربة	Neat ordered نمط مرتب	Slide تتحرك
Vibrate تهتز	Spread out تنتشر	



Learn Exercise 1



1 Choose the correct answer:

1. How are solids unique from other forms of matter?
   a. Solids take the shape of any container.
   b. Solids can be poured.
   c. Solids have a definite size and shape.
   d. Solids fill whatever container they are put in.

2. Brick is considered ....
   a. solid b. liquid
   c. gas d. plasma

3. We can measure weights using ....
   a. meterstick b. scale
   c. thermometer d. measuring tape

4. .... state(s) can be poured.
   a. Liquid and Solid b. Liquid only
   c. Liquid and Gas d. Gas only

2 Put (✓) or (✗) in front of each sentence:

1. Matter can change from one state to another. (   )
2. Objects differ from each other in terms of color, shape, size, and physical state. (   )
3. The particles inside the balloon filled with air vibrate. (   )
4. In liquid materials, particles are sliding over each other. (   )

3 Write the scientific term for each of the following:

1. It is anything that has mass and takes up space. (..............................)
2. It is the tool that is used to measure the temperature. (..............................)
3. It is the state of matter that has the least energy. (..............................)
4. It is the state of matter where particles are freely moving. (..............................)



Lesson 4



- What will happen when you leave the ice-cream out of the fridge?

  Ice-cream will remain as it is. ☐ Ice-cream will turn into liquid. ☐

1. Look at the following figure and read the given sentences, then write the letter of each sentence in its suitable place on the figure:



(A) As particles start to move faster the ice cubes turn into liquid.

(B) Sunlight continues heating up the particles till the liquid turns into vapor (evaporate).

(C) Sunlight falls on the ice cubes.

2. Look at the following pictures, then match each to its suitable 3D model (state of matter):









Parents' Tips

Help your child evaluate his/her understanding of the particles arrangement in different states of matter by answering the given questions.



- Are all tiny particles seen by using magnifying tools?

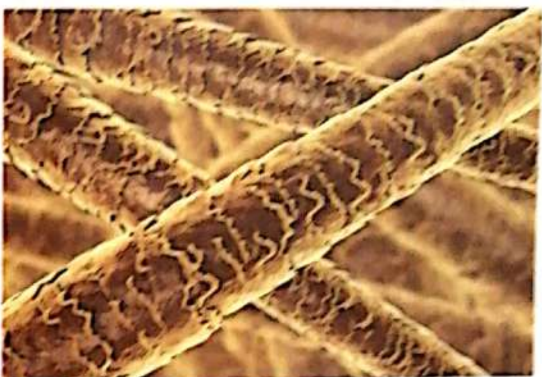
Yes ☐ No ☐

Real Size of Particles

- Particles are extremely tiny, that even normal magnifying tools such as, magnifying lens or even microscopes cannot detect them.
- The real size of any particle depends on its type as well as how it connects to the neighboring particles.

Example:

- "1 hair is about 150,000 to 300,000 particles thick".



How Can We See Particles?

- Technology and Scientists use ...



"Magnifying Glass Lens" to see small objects.



"Electron Microscopes", are special microscopes that help seeing individual particles.

Parents' Tips

Discuss with your child that particles are too tiny to be seen with the naked eye giving examples.

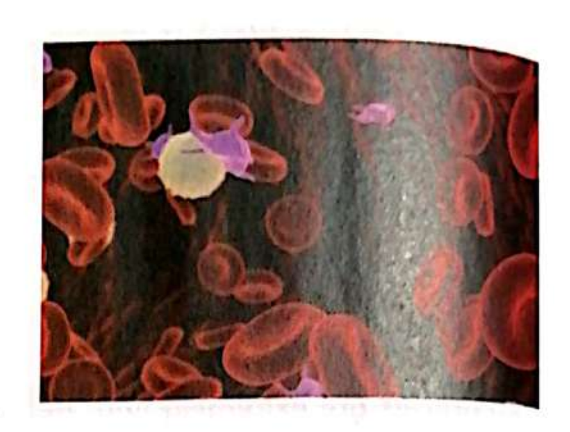
Electron microscope المجهر الإلكتروني





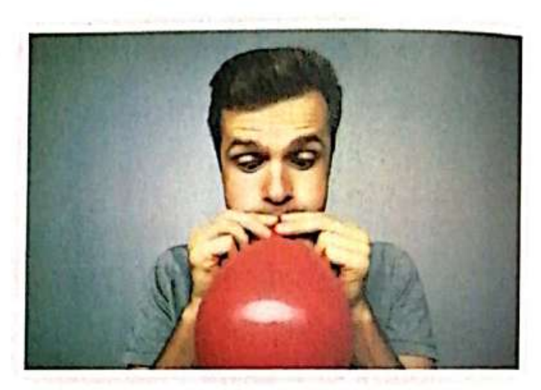


Examples:



- "Blood cells" can be seen under high power microscope.
- Each blood cell is made up of about 100 trillion particles.
- The cell is the building unit of living organisms, it contains millions of particles (molecules).

How Can We Show that Particles Exist?

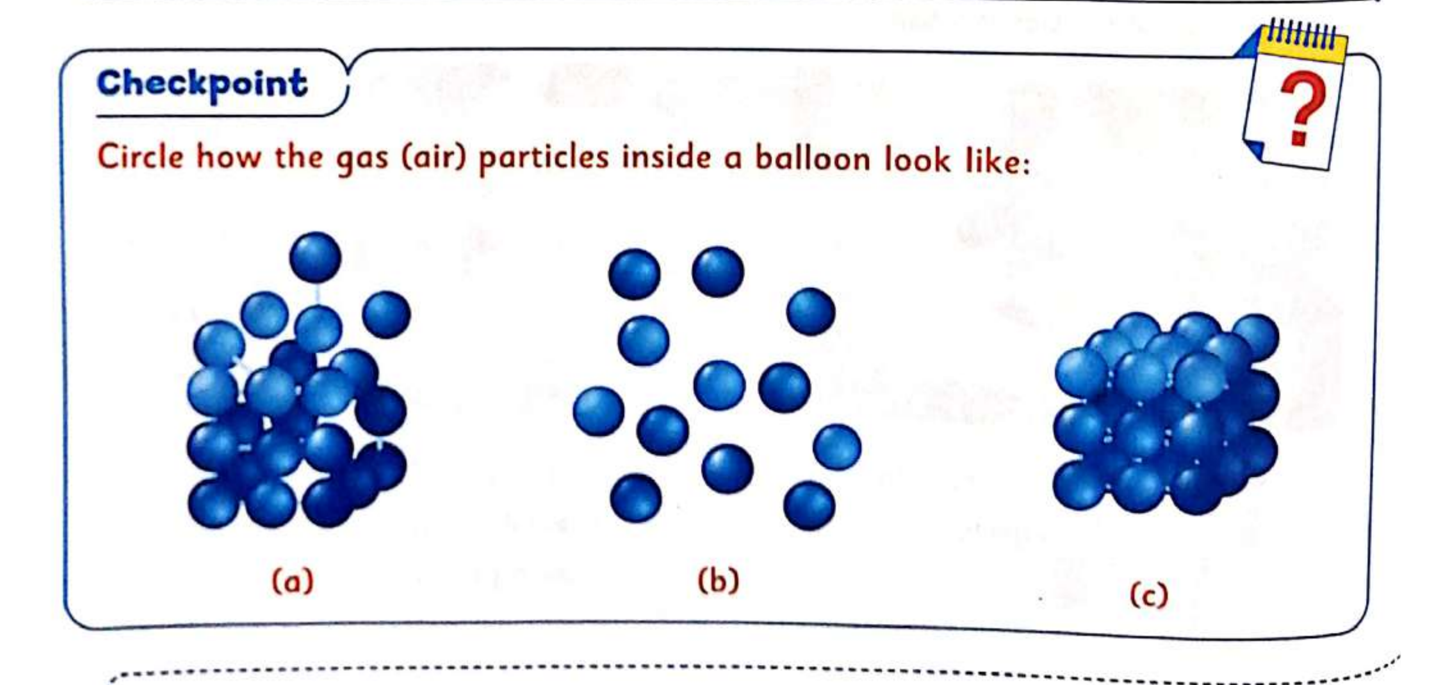


- Although the gas (air) particles are invisible, a balloon expands when we blow it up.
- The tiny size of gas particles moves quickly causing them to bounce (collide) against thinner wall of the balloon causing the inflation of the balloon.
- But, if we squeezed a balloon too hard, it will pop, due to pushing its particles closer together.



Checkpoint

Circle how the gas (air) particles inside a balloon look like:



Blood cells خلايا الدم | Squeezed ضغط | Pop تنفجر

Lesson 5



- Models help us understand things that we can't see easily.
- Which of the following materials can be used to design "particles model" for any state matter?

  Tiny pieces of paper ☐ Ping-pong balls ☐ Syrup ☐

Globe is a Model

- Earth is too big to see while standing on it, but astronauts can see it from the space.



Globe

It is a model of Earth (unreal), that shows you the shape of the Earth.



- Globe shows the main features, the land, and bodies of water existing on earth.

Model

It is a copy that is similar to the real thing.

- Models help us see and understand how things work.
- Scientists use models to study phenomena that might be difficult to observe directly.

How do models help us look at big things



- Most gigantic things are hard to see.

So, models bring them down to size.

Example:

- Solar System Model:
  - Solar system is a very big place.
  - Planets are very big objects.
  - A "solar system model" shows us all planets at once and helps us compare between them (Ex.: size and location).



Parents' Tips

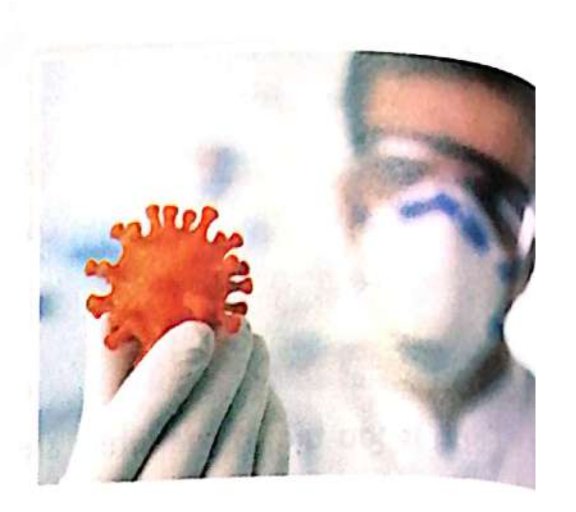
Help your child understand what is meant by a model, and why it is used, giving different examples.

Globe	مجسم الكرة الارضية	Solar system	النظام الشمسي
Model	نموذج	Planets	الكواكب



How do models help us look at small things





- Tiny things are hard to see.

So, models show what we can't see without microscope.

Example:

- Germs Model:
  - Helps us see the different parts that help germs spread from one another.

Models help us understand how things work

Examples:



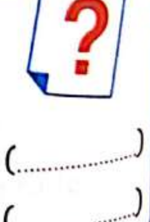
- Volcanic eruption:
  - A model that shows what happens when volcanoes ooze liquid during real eruption.



- Flying airplane:
  - A model that shows how an airplane rise into the air.

- Models are not the same as real things, but each model teaches us something abou a real thing it copies.
- Models are a great way to see and identify many objects of the right size.

Checkpoint



Write the scientific term for each of the following:

1. It is a copy that is similar to a real thing. (..................)
2. It is a model of Earth (unreal) that shows you the shape of the Earth. (..................)

Volcanic eruption انفجار بركاني | Ooze يفرز

Activity 15 Hands On-Investigation: Modeling States of Matter

- Which of the following has particles that move freely?

Iron ☐ Orange juice ☐ Air freshener ☐



Modeling States of Matter

- We have already learned about the three states of matter and the properties of each.

Let's design a model for each state of matter

Caution!! Follow the lab safety guidelines while performing an experiment.



Aim: **Create a model that describes the arrangement of particles in a substance.**

Materials: Buttons – Glue – 3 Index cards (or pieces of cardboard 10×15cm) – Markers.

Steps	Illustration
1 Label the 1st index card "Solid". 2 Glue the buttons to the index card to create a model for the particles in solid. 3 Repeat step no.1 for "Liquid" and "Gas". 4 Repeat step no.2 for "Liquid" and "Gas".	Solid Liquid Gas

Observation:

- The distances between the particles in each model differ from each other.
- In "Solid" model, particles are tightly packed and have a regular pattern.
- In "Liquid" model, particles are close together, but not well organized (randomly arranged).
- In "Gas" model, particles are quite far apart, and not organized at all.

Conclusion:

- Matter is made up of tiny particles.
- The arrangement of particles indicates how materials in each state behaves.

16 Digital Extension Activity

Particles are Always in Motion

- For more knowledge about the motion of particles in the three states of matter, use the Egyptian Knowledge Bank.



Parents' Tips

Assist your child to follow the steps of this experiment to create a physical model for arrangement of particles in different states of matter.





Learn Exercise 2



1 Choose the correct answer:

1. Particles of any substance are ....
   a. too small
   b. in continuous motion
   c. unseen with the naked eye
   d. All the previous answers.
2. The common property between "Solid", "Liquid", and "Gases" is that ....
   a. they have a fixed shape
   b. they can spill
   c. they are made up of particles
   d. they take the shape of their containers
3. Particles of .... are close to each other, but they can slide and flow over each other.
   a. glass b. air c. water d. iron

2 Put (✓) or (✗) in front of each sentence:

1. Matter can be transformed from one state to another. ( )
2. The particles of all substances can be seen using a magnifying lens. ( )
3. The distances between molecules in a solid differ from that of a liquid. ( )

3 Complete the following sentences using words between brackets:

1. Particles of .... are moving very fast. (oxygen – water)
2. The substance is transformed from a solid state to a liquid by .... (heating – cooling)
3. .... help us study things that are hard to be seen, either big or small things. (Lenses – Models)

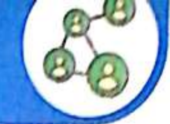
4 Look at the following figure, then choose:

1. The air inside the balloon represents a .... substance. (solid – liquid – gaseous)
2. When the balloon is squeezed, its volume reduces due to .... (the increase in particles' mass – the movement of particles apart from each other – getting particles closer to each other)





SHARE



Lesson 6

17 Activity **Record Evidence: States of Water**



- You have learned about the states of water.
- Now, you can write a scientific explanation, act like a scientist and follow the scientific method.
- Answer the **"Question"** from the **"Can You Explain?"** activity, then share what you have learned with your classmates.

Question:

What are the different forms of matter that can be found in the world around us?

Claim:

- The different forms of matter are "Solids, Liquids and Gases".

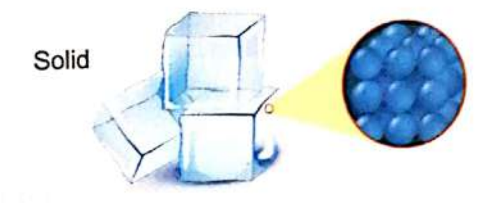
Evidence:

- Matter is made up of very small particles.
- The particles behave differently depending on the state of matter.

Scientific Explanation:

In our world, water exists in three states:

- "Solid", "Liquid", and "Gas"; each of these forms behave in a unique way, due to the nature of their particles.
- These particles change arrangement and movement depending on the state of matter of an object.
- In **solid** materials, particles are tightly packed, neatly arranged and move slowly (vibrate).
- In **liquid** materials, particles have more space to move around and they move faster than solid particles, this is why liquids can be poured and take the shape of their containers.
- In **gaseous** materials, particles spread out. So they can fill any container (have no fixed shape).
- Arrangement and movement of particles can change as the state of matter changes.







Parents' Tips

Help your child follow the scientific method to write a scientific explanation using evidence to support a claim.







Careers and States of Matter

- The states of matter exist everywhere, at home, school, street, and even in different careers.

"States of Matter" in the Kitchen



"When we cook pasta or rice, we start heating some water, once the water boils it starts releasing steam (gaseous state of water)".



"We can blend ice cubes to the fresh juice to keep it cool".



"When we freeze vegetables and fruits, this process keeps them fresh and ready to use for longer periods of time".



"We can guess what is cooked by the smell, or aroma coming from the kitchen".

Scientist Chef



- Chefs use sciences to help prepare creative and delicious dishes.
- Chefs use different states of matter to change ingredients.
- Professional chefs experiment different states of matter in their kitchens.

Parents' Tips
Help your child obtain information about how we can use science while cooking to produce eligible foods from different ingredients.

Chef	طباخ	Aroma
Blend	خلط	



Taste the States of Matter



- Based on what you have learned, imagine you are a chef, and plan a creative meal including various flavors and illustrate the three main states of matter.

1 Science

- Using liquid nitrogen for cooling, as a quick cooling process.



2 Technology

- Using digital sensitive scales for accurate weights of the ingredients.



3 Engineering

- Using a vacuum machine to draw the excess air from the freshly cooked food to reduce its size and the risk of bacterial activity.



4 Mathematics

- Using different measurements and calculations to assure the ingredient's accuracy regarding their weights, volumes, and temperatures.



19 Digital Extension Activity

Review: Matter in the World around Us

- For more knowledge about the matter in the world around us, use the Egyptian Knowledge Bank.



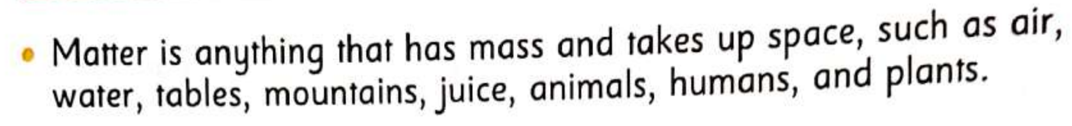
https://study.ekb.eg/



Flavors نكهات | Liquid Nitrogen النيتروجين السائل | Digital sensitive scale ميزان حساس رقمي







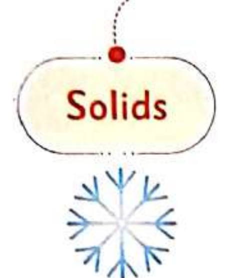
Review: Matter in the World around Us

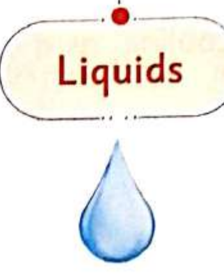


Concept Main Ideas

- Matter is anything that has mass and takes up space, such as air, water, tables, mountains, juice, animals, humans, and plants.
- Most matter on Earth is found in three states ...

Solids | Liquids | Gases



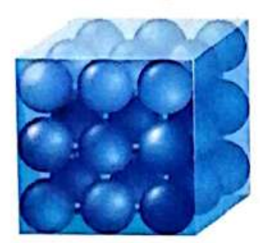






- Each state of matter depends on the arrangement of the particles (molecules).

Solids



Particles ...

(A) Are closely packed together in neat ordered arrangement.

(B) Cannot move/or slide past each other.

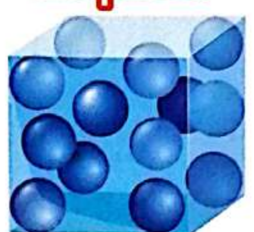
(C) Keep their shape.

(D) Vibrate, they are held together, so they don't move from place to place.

Examples:

Ice cubes – Bricks

Liquids



Particles ...

(A) Are held more loosely.

(B) Can move/or slide past each other.

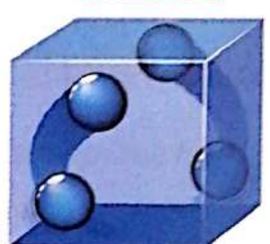
(C) Movement (sliding), helps liquids take the shape of their container.

(D) Move faster than in solids.

Examples:

Water – Oil – Vinegar

Gases



Particles ...

(A) Are not held together.

(B) Can spread out freely, so it can fill any container.

(C) Move very quickly.

Examples:

Oxygen – Carbon dioxide – Perfume

Parents' Tips

Help your child review and explain the main ideas of "Matter in the World Around Us".

Remember Understand Apply Analyze

1 Choose the correct answer:

1. All matter is made of ....
   a. cells b. proteins c. particles d. muscles
2. Matter is ....
   a. anything in the world b. anything that has mass and takes up space
   c. only water in different states d. only solids
3. Which of the following is not true about particles of different substances?
   a. They are in continuous motion. b. They cannot be seen.
   c. They all move at the same speed. d. All the previous answers.
4. Matter that does not have a fixed volume and does not have a fixed shape is ....
   a. a solid b. a liquid c. a gas d. All the previous answers.
5. The steam released from the cooking pot represents a .... substance.
   a. solid b. liquid c. gaseous d. No correct answer.
6. The particles of matter are tightly packed in the .... state.
   a. solid b. liquid c. gaseous d. All the previous answers.
7. Anything that occupies a space is called ....
   a. matter b. mass c. volume d. gas
8. The particles that make up a pencil are ....
   a. very close to each other b. very far from each other
   c. at medium distances from each d. moving very fast
9. All the following materials can be poured, except ....
   a. water b. oxygen c. wood d. air
10. Which of the following states has a fixed shape and a fixed volume? ....
    a. Solid b. Liquid c. Gaseous d. All the previous answers.
11. How are solids unique from other forms of matter?
    a. Solids take the shape of any container.
    b. Solids have a definite size and shape.
    c. Solids can be poured.
    d. Solids fill whatever container they are put in.
12. How can a model be helpful?
    a. Models give us step-by-step instructions about how to build something.
    b. Models make something look better than it does in real life.
    c. Models always make something smaller than it is in real life.
    d. Models can help us see things that are too small or too big to observe.



2 Complete the following sentences using words between brackets:

1. Particles of liquid substances move .... than solid substances. (slower – faster)
2. All things that have mass and occupy space are called .... (matter – energy)
3. Snow, water, and water vapor are examples of .... (one state of water – different states of water)
4. Snow turns into water by .... (heating – cooling)
5. The particles in .... material do not move, but they only vibrate. (solid – gaseous)
6. Steam is the .... form of water. (liquid – gaseous)
7. .... particles have a lot of space. (Spoon – Air)
8. ....particles are packed tightly together. (Solid – Liquid)
9. The states of matter depend on the arrangement of the .... in a substance. (proteins – particles)
10. .... particles are loosely sliding past each other. (Solid – Liquid)
11. .... can take the shape of its container. (Juice – Wood)
12. Particles of .... spread out freely. (solids – gases)
13. Scientists use .... to study phenomena that might be difficult to observe directly. (models – reports)

3 Put (✓) or (✗) in front of each sentence:

1. Matter can change from one state to another. ( )
2. Matter can either be "Liquid" or "Gas". ( )
3. The different ways we describe objects help us define the properties of various states of matter. ( )
4. Solids take up space and have an indefinite shape. ( )
5. Liquids take up space and have a definite shape. ( )
6. Gases take up space all around us, they are visible and have an indefinite shape. ( )
7. Matter is made up of tiny particles that are in continuous motion. ( )
8. Light and sound are forms matter. ( )
9. Liquids can be poured while solids can't. ( )
10. The states of matter depend on the arrangement of particles in a substance. ( )
11. The fuel takes the shape of its container. ( )
12. Models help us understand how things work. ( )
13. When water turns into ice, the speed of movement of its particles increases. ( )
14. The particles of matter can be seen with the naked eye. ( )



15. Glass particles have a definite and organized pattern. ( )
16. Water particles move very quickly. ( )

4 Write the scientific term for each of the following:

1. The gaseous form of water. (..............................)
2. It is anything that has mass and takes up space. (..............................)
3. A state of matter that has vibrating particles. (..............................)
4. A state of matter that has slightly moving particles. (..............................)
5. A state of matter that has freely moving particles. (..............................)
6. An invisible state of matter. (..............................)
7. A tool used to measure temperature. (..............................)
8. A state of matter that has a lot of space between its particles. (..............................)
9. A state of matter that has the least energy. (..............................)
10. They are the building blocks of matter. (..............................)
11. It is a model of Earth (unreal) that shows you the shape of the Earth. (..............................)
12. It is a copy that is similar to the real thing. (..............................)

5 Answer the following questions:

1. **There are three different states of water. The following images are examples of water in its different states. Next to each example image, write the letter of the explanation that describes its current state.**
   (A) Tightly packed water molecules that retain a shape.
   (B) Loosely packed water molecules that take on the shape of their container.
   (C) Loosely packed water molecules that do not have a definite shape or volume.

2. A group of classmates would like to put on a play to act out the states of matter. They will use their bodies to model the arrangement of particles in a solid. Choose the answer that describes how they could use their bodies to model a solid correctly.
   (A) The students would stand with their bodies spread out far apart around the room.
   (B) The students would stand with some space between each other, near to one another but not close enough that they could reach out and touch another student.
   (C) Some students would remain in the classroom, while others would move into the hallway.
   (D) The students would stand very closely together, packed tightly into a small area.

3. What makes gases different from other states of matter? "Choose all that apply".
   (A) Gases can be poured.
   (B) Gases have a definite shape.
   (C) Gases fill the shape of any container they are put in.
   (D) Gases do not have a definite shape.

4. Which two properties of matter make it possible to make star-shaped ice cubes?
   (A) Liquids take the shape of whatever container they are poured into.
   (B) Gases spread out to fill any container.
   (C) Solids have a definite shape.
   (D) Gases have no definite shape.

1 Choose the correct answer:

1. The particles of matter spread out freely in the .... state.
   a. solid b. liquid c. gaseous d. All the previous answers.
2. Anything that occupies a space is called ....
   a. matter b. mass c. volume d. gas
3. Which of the following materials has an indefinite shape and a definite volume?
   a. Solid. b. Liquid.
   c. Gaseous. d. All the previous answers.
4. All matter is made of ....
   a. cells b. proteins c. particles d. muscles

2 Complete the following sentences using words between brackets:

1. A/AN .... is considered a copy of a real thing, that is used to illustrate how it works. (Model – Article)
2. .... substances cannot be poured. (Solid – Liquid)
3. Matter occupies space and has .... (mass – energy)
4. .... is a substance that does not have a fixed shape. (Juice – Table)
5. .... particles are packed tightly together. (Solid – Liquid)

3 (A) Put (✓) or (✗) in front of each sentence:

1. Matter exists in only two states. (   )
2. The oil takes the shape of the container in which it is placed. (   )
3. We can see air. (   )

(B) Answer the following questions:

1. Arrange the following in the order of increasing space between their particles:
   a. Milk - Air - Table. ....
   b. Smoke - Paper - Oil. ....
2. What are the properties of solids, liquids and gases?
   a. Solids have .... volume and shape.
   b. Liquids have .... volume but .... shape.
   c. Gases have .... volume and shape.

Assess Your Progress ★★★★★

< 50%	50 : 64%	65 : 84%	85 : 100%
Study again.	Practice more.	Solve more exams.	Well done!



Describing and Measuring Matter

Concept Objectives

By the end of this concept, the student will be able to:

- Classify materials based on their properties and describe patterns in the properties of similar materials.
- Choose the proper tools to measure the size and volume of different kinds of materials in different states of matter.
- Plan and conduct investigations to gather and record information about the properties of various materials.
- Analyze data to identify unknown materials.

Lesson 1



Can You Explain?

- All things are made of matter and have different characteristics.
- We have previously learned that matter could exist in three states which are ...., ... and ....

Look at the following picture, then identify the state of the labeled items:

The ice cubes represent the .... state.

The water vapor represents the .... state.

The orange juice represents the .... state.

The spoon represents the .... state.

So, matter could be described using its physical state.

How is matter described and measured 

- In this concept, we will learn how matter can be described using its physical and chemical properties, and how can matter be measured using different tools.

Parents' Tips

Help your child observe the picture to explain what he/she knows about the properties of various materials depending on their states.

Described توصف



A Roof for Every Climate



- Every building should have a roof, as roofs have important roles.

Roles of Roofs

1. Keep buildings cool during hot climates or warm during cold climates.
2. Protect the building's structure.
3. Protect the building from the elements, such as wind, rainfalls, animals, and dust.

Climate and Roofs

- Houses differ according to the climate of the environment in which they are located in. So, the materials used in the manufacture of the roofs must be strong and tightly packed to last for long periods.

A Roof Materials

- Some types of materials could reflect or absorb the heat energy coming from the sun.

Roofs could be made of:

- Leaves and sticks
- Mud
- Ceramic tiles
- Asphalt
- Shingles
- Wood
- Metal
- Grass

What happens when rain falls on a muddy roof?

It will be destroyed easily.

So, During building we must know well the advantages and disadvantages of the roof material.

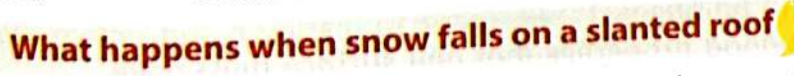


B Roof Shapes

- The shape of roofs varies according to their purpose.

Roof could be:

- Flat
- Slanted



What happens when snow falls on a slanted roof?



The snow will slide down and won't accumulate on the roof.

Parents' Tips

Help your child ask questions and think about the different types of roofs he/she can observe on buildings.

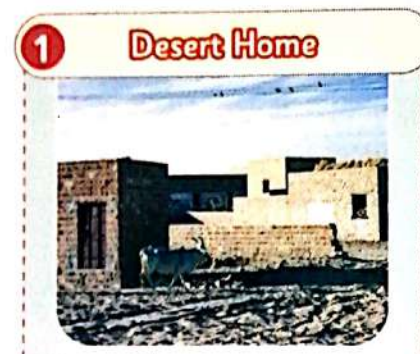




Some surfaces are designed to help absorb the sun's heat, and some are designed to help reflect the sun's heat.

Let's examine the properties of some roofs in different climates, as well as their roofing materials and shapes

1 Desert Home



Roof Shape

- Flat and solid

▶ To reflect the heat coming from the Sun.

Roofing material

- Ceramic tiles
- Asphalt shingles

2 Cold Weather Home



Roof Shape

- Slanted and solid

▶ To allow snow to slide over it.

Roofing material

- Wood
- Metal

3 Tropical Rainforest Home



Roof Shape

- Slanted and tightly packed materials.

▶ To prevent rain from entering the house and allow it to slide.

Roofing material

- Mud
- Tree branches and leaves.

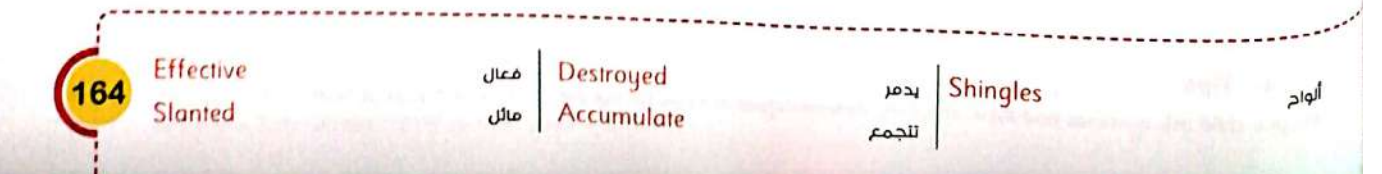


- Create a foldable that discusses roof materials and shapes in different climates, then share your foldable with your classmates.



Search the internet

- Search the internet about the good properties that any surface must have.



Effective فعال
Slanted مائل
Destroyed يدمر
Accumulate تتجمع
Shingles ألواح





3 Activity What Do You Already Know About Describing and Measuring Matter?

Describing Matter

- Matter is found all around us. It could be described and classified according to its properties.
- Matter can be described using color, shape, size, texture, odor, and state of matter.

Choose the correct answer from the two brackets to complete the following table:

Item	Property
1. Vinegar	It has (odor – no odor), and is found in (solid – liquid) state.
2. Sand	It has a (powder – granular) texture, and (yellow – green) color.
3. Marble	It has a (rough – smooth) texture, and a (cone – spherical) shape.
4. Corn starch	It has a (white – black) color, and a (fine – large) particle size.

Measuring Matter

Write down the suitable property in front of its suitable measuring tool:

Temperature – Mass – Length – Volume of liquids

Measuring Tool	Measured property
1. Balances (Scales)	....
2. Measuring cups	....
3. Thermometer	....
4. Measuring tape	....

Why is it useful to measure different matter properties



- Every matter has a variety of properties. Depending on its use, we may need to measure more than one property to determine if it is the right one to use.

Parents' Tips

Help your child evaluate his/her prior knowledge about how he/she can measure different properties of matter using suitable measuring tools.

Tools	أدوات
Volume	حجم



Lesson 2

  Activity 4 Hands-On Investigation: The Case of the Kitchen Mystery



- **Look at the following figures, then complete:**

To differentiate between white sesame seeds and habet El-baraka seeds, you can use your .... sense.





So, Sight sense is useful to distinguish between different sizes, shapes, and colors, while touch sense will be most helpful for different textures.

A Mystery Mixture

- Seba tried to make cookies for her mother's birthday. She set up all the components, but two of them were mixed together, and she had no idea what they were.

How could Seba know the components of the mystery mixture

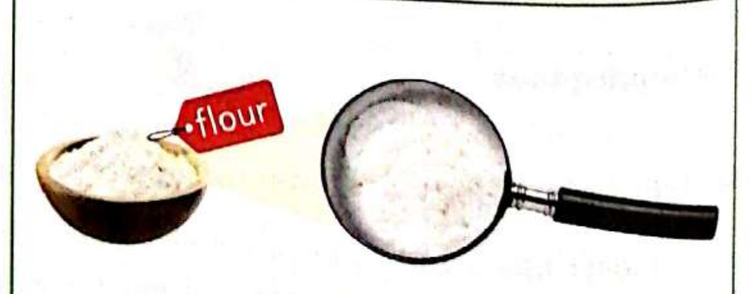
Let's conduct an experiment to help her know the components of the mystery mixture depending on its physical properties





Aim: Identify the observable properties of different substances using their physical properties.

Materials: 20 g Sugar– 20 g Salt - 20 g Baking powder – – 20 g Flour – Hand lens – 20 g of Mystery mixture

Steps	Illustration
1 Prepare 20 g (equal amounts) of flour, sugar, salt and baking powder, then label each plate with the name of the material.	

Parents' Tips

Help your child know how he/she can differentiate between different matter depending on their observable physical properties such as color, odor, smell, and texture.





2 Label the unknown mixture as "**Mystery mixture**".

3 Observe each substance by:
- Identifying the color.
- Identifying the shape using the hand lens.
- Smelling the substances.

4 Record your data in the following table to be able to identify the mystery mixture.

Data Table

Substance	Color	Odor	Texture	Other properties
Flour	White	Odorless	Smooth	fine particles
Baking powder	White	Odorless	Smooth	Very fine particles
Sugar	White	Odorless	Granular	Large crystals
Salt	White	Odorless	Granular	Small crystals
Mystery Mixture	White	Odorless	Granular and Smooth	Small crystals and very fine particles

Observation:

- All materials have the same color and odor, but they have different textures.

Conclusion:

- Some physical properties of different materials could be similar.
- We can identify matter depending on its physical properties using our senses.

According to the observations, the mixture is made up of...



Note The hand lens magnifies objects and enables us to see small crystals.

5 Digital Extension Activity

Hands-On Investigation: Shape and Volume of Liquids and Solids

- For more knowledge about how the shape and volume changes by changing the state of matter, use the Egyptian Knowledge Bank.



https://study.ekb.eg/



Mixture مزيج/خليط | Mystery غامض | Differentiate يميز



Learn Exercise 1



1 Choose the correct answer:

1. Slanted roofs ....
   a. prevent accumulation of snow on the roof
   b. allow rain to slide down
   c. allow animals to enter the house
   d. (a) and (b)
2. The volume of orange juice is measured by ....
   a. thermometer b. scales c. measuring cups d. measuring tape
3. To differentiate between water and vinegar, we must observe their................................ .
   a. color b. smell
   c. texture d. All the pervious answers
4. .... is used to measure the length of your pencil.
   a. Ruler b. Scales
   c. Measuring cups d. No correct answer

2 Complete the following sentences using words between brackets:

1. Temperature is measured by .... (measuring cup – thermometer)
2. .... sense distinguishes between texture of sugar and flour. (Sight – Touch)
3. Tropical rainforest houses roofs are made of................................ . (asphalt shingles – branches)
4. The physical properties of water in its solid state are .... those in its liquid state. (different from – similar to)
5. Cold weather houses have .... roofs. (flat – slanted)

3 Put (✓) or (✗) in front of each sentence:

1. Properties of matter can't be described. ( )
2. Different kinds of matter can share the same physical properties. ( )
3. We can observe the physical properties using our senses. ( )
4. Matter can't be measured. ( )
5. Roofs protect buildings from wind, dust, and rainfalls. ( )







- There are some properties of matter that can't be distinguished and observed easily.

Let's explore other ways to distinguish between different properties of matter

Properties of Matter

- Matter can be described by using its physical or chemical properties.

A Physical properties

- They describe matter based on its color, shape, odor, texture, and physical state.
- They can be observed using the five senses.

Ex. **Color of silver and gold**



Odor of vinegar and perfume





Granular and powder textures





B Chemical properties

- They describe matter based on its ability to change into a new substance that has different properties.
- They can be observed only by **changing the substance into a new one.**



Ex. **Flammability**

(When paper is burned, it becomes ash)



Rusting



Parents' Tips

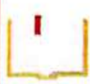
Help your child know how he/she can describe matter depending on its physical and chemical properties.



Let's learn more about some physical properties of matter

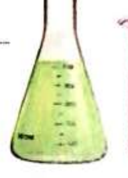
1 Volume

- Volume is a physical property of matter that can be measured using "Measuring cups".



Volume

It is the amount of space that matter takes up.





Measuring Units

- Volume is measured in:

Liters (L)	Milliliters (ml)	Cubic centimeters (cm^3)
• It is used in measuring large volumes of **liquids**. Ex. A big bottle of juice	• It is used in measuring small volumes of **liquids**. Ex. A bottle of medicine	• It is used in measuring small volumes of **liquids** or **solids**. Ex. Dimensions of a box

- 1 Milliliter (ml) = 1 Cubic centimeter (cm^3)
- 1 Liter (L) = 1000 Milliliters (ml) or 1000 Cubic centimeters (cm^3)
- To convert liters to milliliters, all you need to do is to multiply the number of liters by 1,000.



3 L = (3 × 1000) ml
= 3000 ml ✓

2 Mass

- Mass is a physical property of matter that can be measured using **Balances or Scales**.



Mass

It is the amount of matter in an object.



Measuring Units

- Mass is measured in:

Grams (g)	Kilograms (kg)
• It is used in measuring **small** masses. Ex. Jewelry	• It is used in measuring **large** masses. Ex. Fruits, mass of your body

- 1 Kilogram (Kg) = 1000 Grams (g)







Texture	ملمس	Conduction	التوصيل	Granular	حبيبي
Flammability	القابلية للاشتعال	Ash	رماد	Rusting	الصدا
Volume	حجم	Mass			



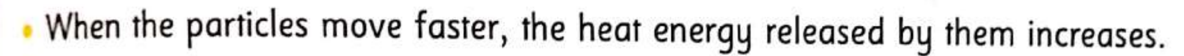


- 1 Kilogram (Kg) = The mass of 1 liter of distilled water.
- 1 Gram (g) = The mass of a paperclip.

- To convert kilograms to grams, all you need to do is to multiply the number of kilograms by 1,000.

Examples

8 Kg = (8 × 1000) g
= 8000 g ✓



3 Temperature



- Temperature is a physical property of matter that can be measured using **Thermometer**.
- **Temperature** is the measure of how quickly the particles in a substance are moving.
- When the particles move faster, the heat energy released by them increases.

So, particles that **move faster** can give off **more heat energy** than **slower** ones.



7 Digital Extension Activity



Observable Properties

- For more knowledge about the properties of matter that can be observed easily and how they can be measured, use the Egyptian Knowledge Bank.



https://study.ekb.eg/

8 Digital Extension Activity

Does Gas Have Mass?

- For more knowledge to understand how gases have mass, use the Egyptian Knowledge Bank.

Checkpoint



Complete the following sentences using the given words:

(milliliter – chemical – 10000 – kilogram – balance – 1000 – physical)

1. Small volumes of liquids are measured in ....
2. The mass of an object is measured by ....
3. 10 kg = ... g
4. Temperature is a .... property of matter.

Particles جسيمات

Lesson 3



9 Activity — Hands-On Investigation: Measuring Properties



- Look at the following figure, then complete the following table:
  (cork – ball – pencil – stone – egg – rubber – key – coin – nail)

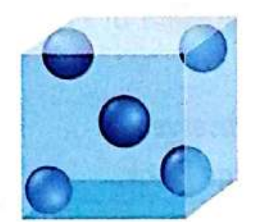


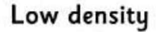
Objects Sink	Objects Float
....	....
....	....
....	....

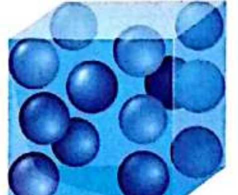
Density

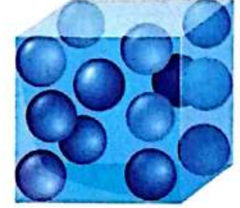
- Matter is made up of tiny particles that are called molecules.
- Density is a physical property that determines whether an object will float or sink in another substance.

So, objects with tightly packed molecules have greater density than those whose molecules spread out.







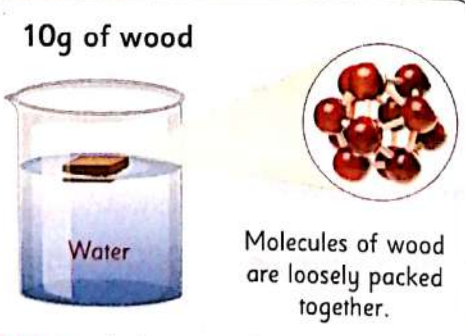




Low density → High density

Let's observe why some objects sink, while others can float

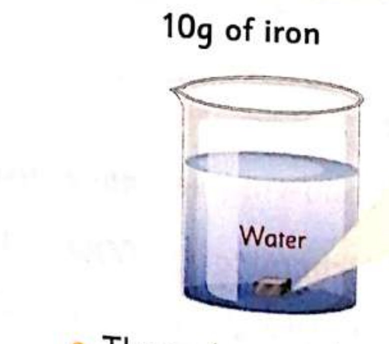
10g of wood



Molecules of wood are loosely packed together.

- The volume of the wood piece is larger than its mass, so it floats on water surface.

10g of iron





Molecules of iron are tightly packed together.

- The volume of the iron piece is smaller than its mass, so it sinks in water.

Parents' Tips

Help your child learn and investigate a new physical property (Density) and identify how the tightly packed molecules affect the density of an object.



Let's conduct an experiment to measure some physical properties of matter



Aim: Identify and measure some physical properties of matter.

Caution!! Follow the lab safety guidelines while performing an experiment.

Materials: Bar magnet – Balance – Water – Metric ruler – Wooden blocks – Aluminum foil – Paper clips – Water basin

Steps	Illustration
1 Choose some objects made of different materials to identify their physical properties. (Wooden blocks, Aluminum foil, Steel paper clips)	
2 Put all objects in the water basin.	
3 Approach the magnet to all objects.	
4 Measure the length of each using the ruler, and their mass using balance.	

Observation:

Property	Steel paper clip	Aluminum foil	Wooden block
Color	Silver	Silver	Brown
Sink or Float	Sinks	Sinks	Floats
Mass	....	....	....
Length	....	....	....
Attracted to magnet or not	Attracted	Not attracted	Not attracted

Density كثافة | Tightly packed متراص باحكام | Spread out متفرق/منتشر

Approach قرب







Conclusion:

- Some objects are attracted to the magnet (paper clip), while others are not (wooden block and aluminum foil).
- Some objects can float (wooden block), while others sink (steel paper clip and aluminum foil).
- Matter can be observed and measured using a set of properties such as color, density, mass, and magnetism.

Does any change occur to matter affect its properties 

- Most properties will not change, but the mass will differ from its original mass.

Examples:

1. If the aluminum foil is folded, its mass will be the same to the original one.



Mass = 3 g



Mass = 3 g

2. But, if we cut it into two equal halves its mass will be decreased to the half.



Mass = 3 g



Mass = 1.5 g



Mass = 1.5 g



Cutting objects does not change their density, but sometimes the object will not float after cutting it into two halves, such as a ping-pong ball.

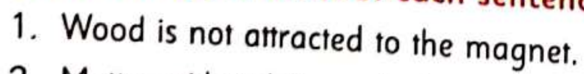
Checkpoint



Put (✓) or (X) in front of each sentence:



1. Wood is not attracted to the magnet. (   )
2. Matter with tightly packed molecules has great density. (   )



3. Changing the mass of a matter affects its density. (   )





10 Activity Measuring Matter

- We have previously learned that we can compare different kinds of matter using measurements and different matter properties.

Seba measured several objects and recorded her measurements in the table below.

Measured Property	Object (1)	Object (2)	Object (3)
Mass (g)	189	150	99
Length (cm)	37	55	23
Volume (ml)	100	115	5

Based on the data in the table, choose the correct answer:

1. (Object 1 - Object 3) .... contains more matter than object 2.
2. (Object 2 - Object 3) .... is longer than object 1.
3. (Object 2 - Object 3) .... takes up more space than object 1.

So, we can conclude from the patterns in the data table:

It is not true that matter that takes up more space has more mass.

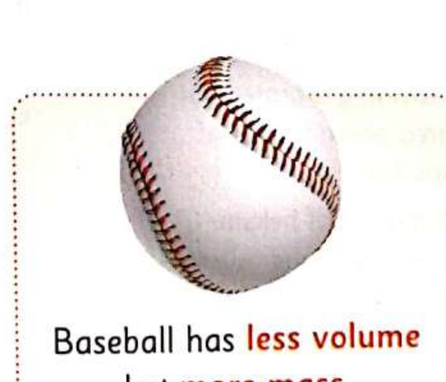
A pattern is repeated data with predictable results.

Examples:

Milk carton and Baseball.



The empty milk carton has **more volume** but **less mass**.



Baseball has **less volume** but **more mass**.



Note

- Some objects have more matter packed into a smaller amount of space than other objects.

Parents' Tips

Help your child evaluate his/her understanding by analyzing the pattern (relation) between the mass and volume of objects.

Pattern أنماط | Predictions توقعات





Lesson 4



- Is it true that each matter has its own set of properties? Yes ☐ No ☐

Properties of Matter and its Uses

- Each matter has its own properties, and these properties affect its uses.

Let's analyze the properties of some materials from our daily lives and how these properties have advantages for specific purposes

1 Helium

Physical properties and uses:

- It is a gas.
- It is lighter than air, so it rises up.

▸ It is used in filling balloons and blimps.



Chemical properties and uses:

- It is not poisonous.
- It is not flammable.

▸ It is used in:
- Nuclear medicine.
- Providing a protective area around types of welding.
- A mixture of helium and oxygen that is used by divers underwater.

2 Copper

Physical properties and uses:

- It is a metal.
- It can be stretched into a thin, flexible wires.
- It conducts electricity well.

▸ It is used in making electrical wires.



- It conducts heat well.

▸ It is used in making copper cooking pots.



3 Glass

Physical properties and uses:

- It is a transparent material and can be easily shaped.

▸ It is used in making:
- Eyeglasses
- Windows
- Cups and jars







Conduction is the process by which heat or electricity can easily pass through a substance..



Unlike copper:

- Wood cannot be stretched and doesn't conduct electricity.
- Wood and plastic can't conduct heat.
- Electric wires are covered with plastic, as it doesn't conduct electricity.

Parents' Tips

Help your child analyze the specific properties of some materials to know the best uses of each one.



12 Activity — Uses of Matter

- From the previous activity, we have learned that the properties of a material determine its suitability for a particular use and function.

Read the words in the box below to help you identify the properties that make each listed material suitable for the stated purposes:

- Transparent
- ~~Strong~~
- ~~Waterproof~~
- ~~Flexible~~
- ~~Hard~~
- Smooth
- Bad conductor of heat
- Bad conductor of electricity

Material	Uses	Properties
1 Steel	Screwdrivers, Hammers, Bridges	Hard, Strong
2 Rubber	Tires, Athletic shoes, Gloves	Waterproof, Flexible
3 Glass	Windows, Eyeglasses	....
4 Plastic	Handles of cooking pots, Covers for electric wires	....

Challenge

- Make a poster about other different materials showing their specific properties related to their application, then share your poster with your classmates.

Parents' Tips

Help your child evaluate his/her understanding to identify the properties of matter that determine its function and uses.





Learn Exercise 2



1 Choose the correct answer:

1. All of the following represent the physical properties of matter, except ....
   a. state of matter b. texture c. color d. flammability
2. Physical properties are ....
   a. properties that can be observed without changing the identity of a substance
   b. properties that describe how a substance changes into a completely different substance
   c. properties that we can only observe with our senses
   d. (a) and (c)
3. Matter that has high temperature its molecules ....
   a. move fast b. move slowly c. don't move d. No correct answer
4. Divers use a mixture of .... and .... under water.
   a. oxygen and helium b. oxygen and hydrogen
   c. helium and hydrogen d. oxygen and carbon dioxide
5. Ice cubes float in water, because ....
   a. the ice cubes are more dense than the water
   b. the water is more dense than the ice cubes
   c. the water is more dense than the glass
   d. No correct answer

2 Complete the following sentences using words between brackets:

1. .... equals to the mass of a paper clip. (1 gram – 1 liter)
2. Faster moving particles of matter produce .... heat, than slower particles. (more – less)
3. Windows are made from glass, as glass is .... (transparent – opaque)
4. .... is one of the chemical properties of matter. (Rusting – Flexibility)
5. Density of 10 g of silver .... the density of 50 g of silver. (is more than – is equal to)

3 Put (✓) or (✗) in front of each sentence:

1. 1 L is equal to 1000 cm^3. (   )
2. Cork molecules are tightly packed than iron, so it sinks. (   )
3. Helium is not poisonous, so it is used in nuclear medicine. (   )







Lesson 5



13 Activity Record Evidence: A Roof for Every Climate



- You have learned a lot about how we can describe matter depending on its physical properties and chemical properties.
- Now, you can write a scientific explanation, act like a scientist and follow the scientific method.
- Answer the "**Question**" from the "**Can You Explain?**" activity, then share what you have learned with your classmates.

Question:

How is matter described and measured?

Claim:

Matter can be described and measured by making observations and using tools.

Evidence:

Matter has both physical and chemical properties that can be described and measured such as:

1. Physical properties:
   Ex. - Color, shape, odor, volume, texture, magnetism, and density.
2. Chemical properties:
   Ex. -The ability of a substance to burn or rust.

Scientific Explanation:

- Matter can be described using our senses.
- Some properties, require measurements and using tools:
  - A balance is used to determine mass.
  - Ex. - A measuring cup is used to measure the volume of liquid.
  - A thermometer is used to measure temperature.
- Some properties require experimentation to determine:
  Ex. - The ability of matter to sink or float.

Parents' Tips

Help your child return to the investigative phenomenon and "Can you explain?" question to construct a scientific explanation with evidence.







Careers and measuring Matter

- Different careers rely on accurate measurements of matter.

How important is it to understand and measure matter 

- By measuring objects, we can better understand the world around us. Time, size, distance, speed, direction, mass, volume, temperature, pressure, force, sound, light, and energy are some of the physical properties for which we have developed accurate systems to measure.

Let's analyze the relationship between some jobs and the importance of measuring matter

Architects and Builders

Architects and builders during building must:

- Know the correct dimensions before putting up walls.
- Understand the properties of materials as how strong and durable a material is.

So, knowledge of properties and correct measurements helps ensure safe buildings.



Bakers

Bakers constantly measure the volume and mass of ingredients in recipes to be precise.

Ex. If they use too much or too little amount of baking powder, the cake will be ruined.

So, the correct ratio of dry and wet ingredients gives the right texture to baked goods.



Parents' Tips

Help your child know that some careers rely on the accurate measurements of matter.

Architect	مهندس معماري
Accurate/Precise	دقيق

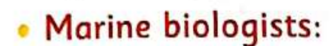


Scientists

Scientists often measure matter during their research.


Paleontologists

- **Paleontologists:** (Ex.)
  They measure the size and shape of fossils.
- **Space scientists:**
  They measure the mass of planets and stars.
- **Biologists:**
  They often measure the size and mass of organisms.



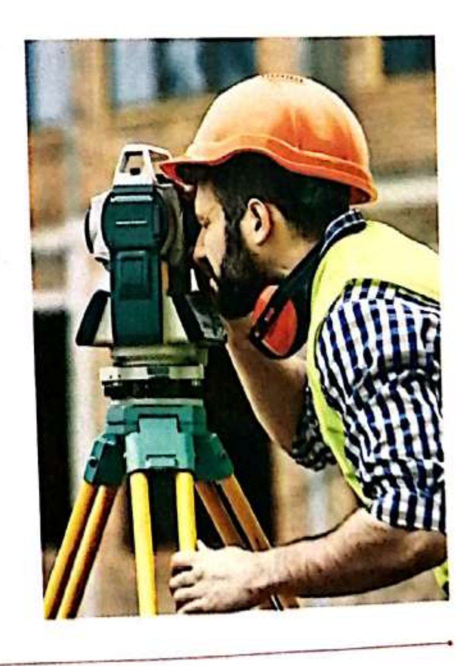
- **Marine biologists:**
  They measure the speed of sound from animals such as whales and dolphins.
- **Scientists:**
  They use precise measurements when conducting experiments, such as determining the changes to a population of organisms or to predict outcomes.


Chemist

Cartographers

Cartographers are responsible for measuring and mapping Earth's surface and plays a key role in the field of geospatial information systems (GIS).

- They develop city maps to help tourists find their way.
- They use photos to make a map of the moon's craters.
- They create nautical charts to help guide ships through dangerous waters.
- They can make an accurate model of how rainfall can affect an area's watershed by collecting rainfall data.





Cartographers collect, analyze, interpret, and map geographic information from surveys, data, and photographs by using airplanes and satellites.

Paleontologist عالم الحفريات | Cartographer رسام خرائط | Geospatial جغرافيا المكان



How are maps helpful





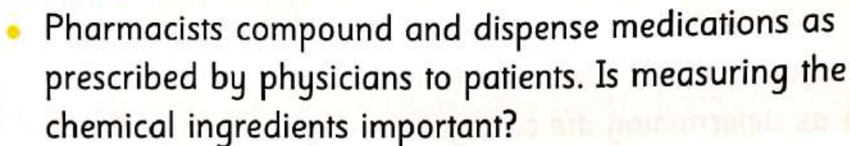
Maps can give us much more information than just directions.

- It gives us topographic, climate, and even political information.
- The maps and models can be used by policy makers to make informed decisions.



- Measuring and tracking data is an important part of running a successful business.
- Based on what you have learned, do research in the following fields about the relationship between measuring materials, knowing their properties, and how different careers rely on these descriptions and measurements.







1 Science

- Pharmacists compound and dispense medications as prescribed by physicians to patients. Is measuring the chemical ingredients important?



2 Technology

- In medicine factories, machines and equipment are more accurate than human. Find the advantages of machine and equipment dependent in medicine industry.



3 Engineering

- Weighing is one of the ways that can be used to measure matter. Try to make a prototype of a balance scale, then test it.



4 Mathematics

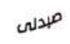
- When a pharmacist applies a formula, he/she must know the amount and percentage of each component to be accurate.
- Find out the conversions between different measuring units that could be used in this field.



15 Digital Extension Activity

Review: Describing and Measuring Matter

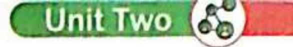
- For more knowledge about describing and measuring matter, use the Egyptian Knowledge Bank.



Egyptian Knowledge Bank
بنك المعرفة المصري
https://study.ekb.eg/

Topographic information المعلومات الطبوغرافية | Political information المعلومات السياسية | Pharmacist صيدلي







Review: Describing and Measuring Matter

Concept Main Ideas



- Matter can be described using its properties.
- Properties of matter can be categorized into:

Properties of Matter

Physical Properties

- They can be observed without changing the identity of the matter.
- They can be observed using the five senses.

Ex. Color, shape, mass, volume, hardness, magnetism, destiny, heat, and electric conduction.

Chemical Properties

- They describe matter based on its ability to change into a new substance that has different properties.
- They are only measurable by changing the material into a new one

Ex. Flammability and rusting.

- Matter can be also measured using special tools and equipment for a specific property.

Mass

Definition

It is the amount of matter in an object.

Measured in

Grams (g) | Kilograms (kg)

- 1 Kilogram (Kg) = 1000 Grams (g)

Kilogram (Kg) → x 1000 → Grams (g)

Measured by

Balances or scales

Volume

Definition

It is the amount of space that matter takes up.

Measured in

Liters (L) | Milliliters (ml) | Cubic centimeters (cm^3)

- 1 Milliliter (ml) = 1 Cubic centimeter (ml)
- 1 Liter (L) = 1000 Milliliters (ml) or 1000 Cubic centimeters (cm^3)

Liter (L) → x 1000 → Milliliters (ml)

Measured by

Measuring cups

Parents' Tips

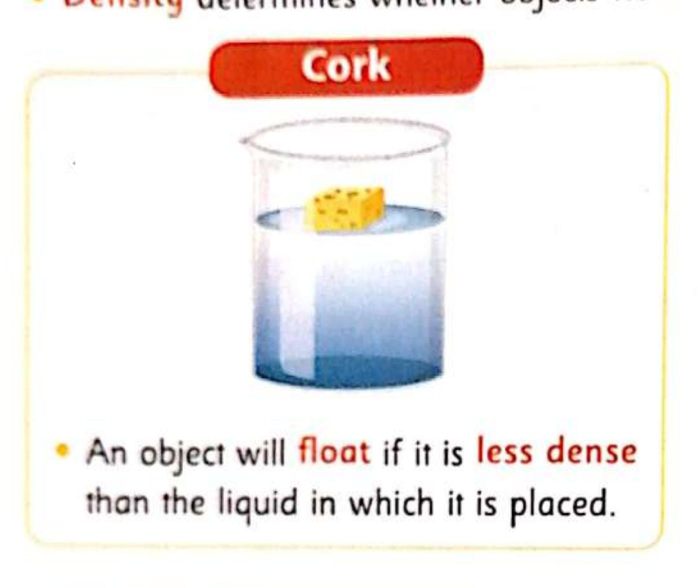
Help your child revise and summarize what he/she has learned about describing matter depending on its physical properties.



SHARE

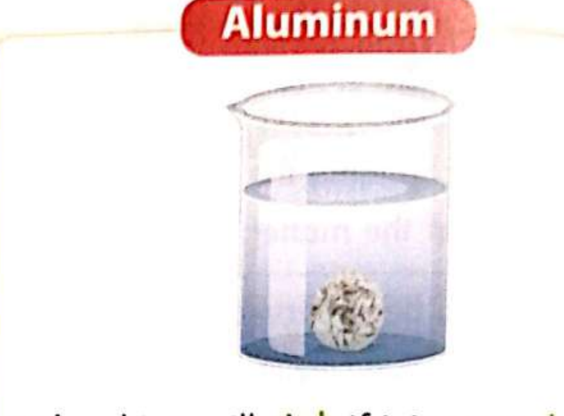
- Mass of matter depends on the amount of matter in it, not its volume.
- **Temperature** is the measure of how quickly the matter particles are moving.
- Particles that **move faster** can give off **more heat energy** than **slower** ones.
- Temperature is measured by **thermometers**.
- **Length** can be measured using **measuring tape** or **metric ruler**.
- **Density** determines whether objects float or sink in another substance.

Cork



- An object will **float** if it is **less dense** than the liquid in which it is placed.

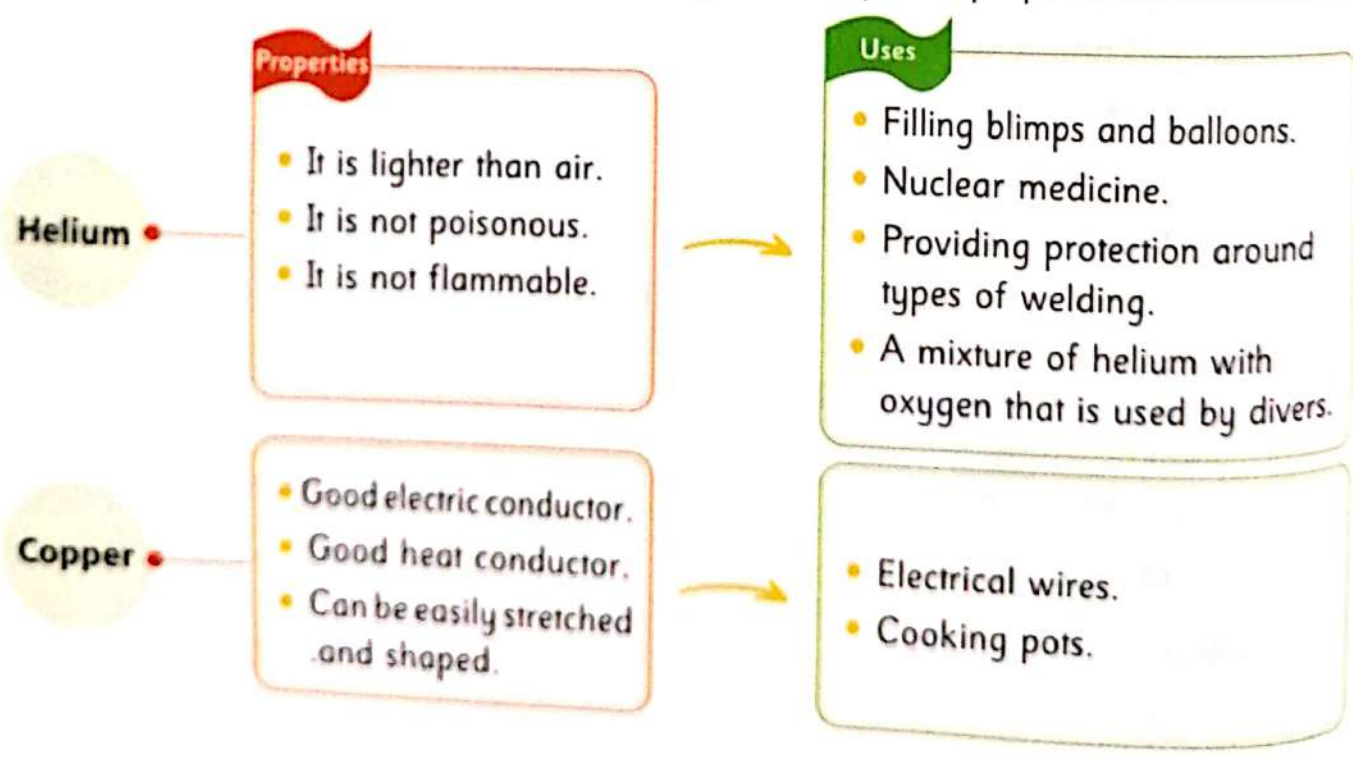
Aluminum



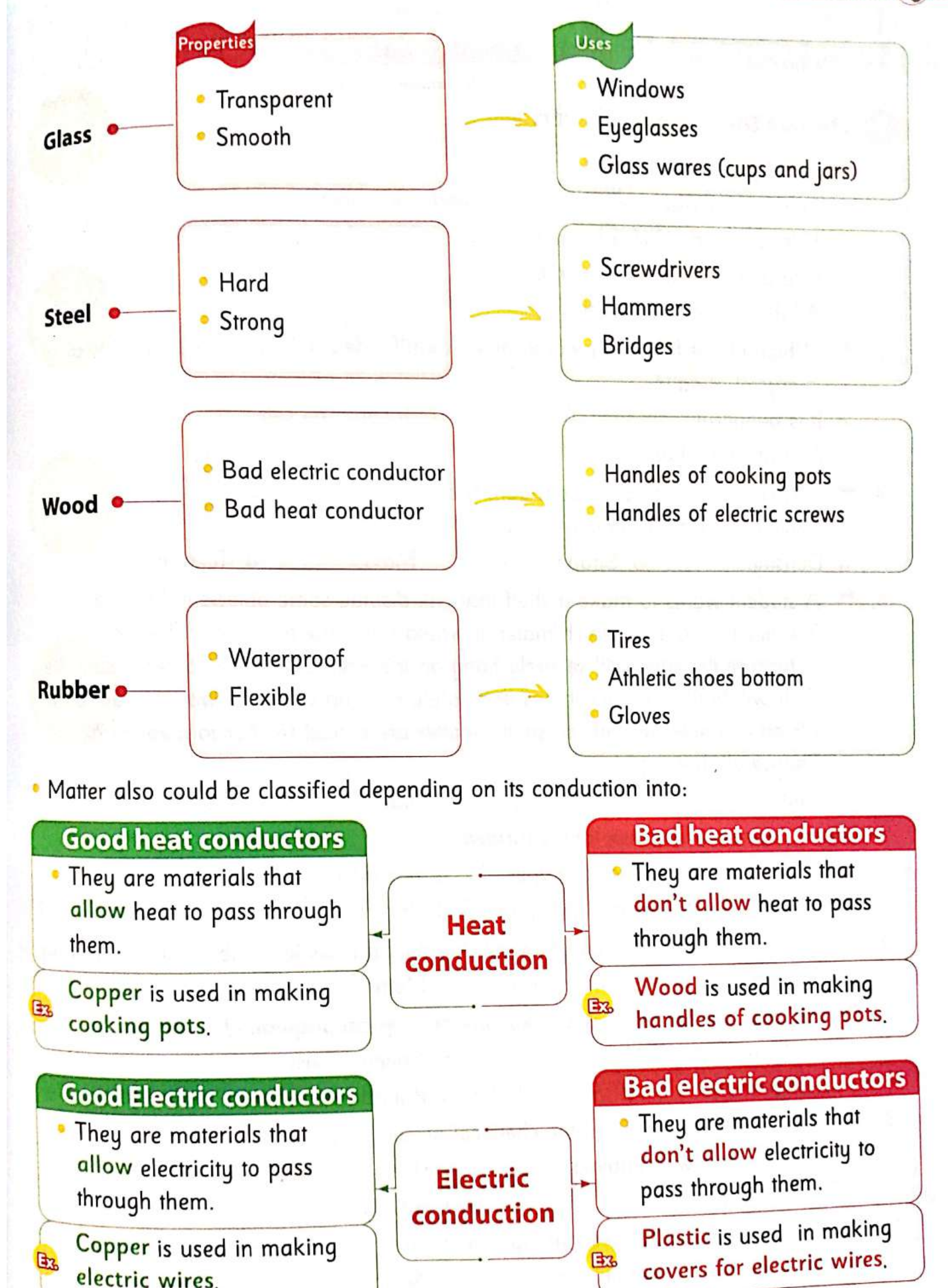
- An object will **sink** if it is **more dense** than the liquid in which it is placed.

Objects with **tightly packed** molecules have **greater density** than those whose molecules **spread out**.

- Specific properties of a matter can be advantageous for specific purposes and uses such as:






Properties
Uses
Glass
Transparent
Smooth
Windows
Eyeglasses
Glass wares (cups and jars)
Steel
Hard
Strong
Screwdrivers
Hammers
Bridges
Wood
Bad electric conductor
Bad heat conductor
Handles of cooking pots
Handles of electric screws
Rubber
Waterproof
Flexible
Tires
Athletic shoes bottom
Gloves
Matter also could be classified depending on its conduction into:
Good heat conductors
They are materials that allow heat to pass through them.
Ex. Copper is used in making cooking pots.
Heat conduction
Bad heat conductors
They are materials that don't allow heat to pass through them.
Ex. Wood is used in making handles of cooking pots.
Good Electric conductors
They are materials that allow electricity to pass through them.
Ex. Copper is used in making electric wires.
Electric conduction
Bad electric conductors
They are materials that don't allow electricity to pass through them.
Ex. Plastic is used in making covers for electric wires.

PRACTICE

Concept 2
Describing and Measuring Matter

Remember · Understand · Apply · Analyze

1 Choose the correct answer:

1. Physical properties of matter ....
   a. help us describe, identify, classify, and use matter
   b. help us decide if it's magnetic or not
   c. help us know the state of matter
   d. All the previous answers

2. Which of the following would be a scientific description of the properties of a crystal of salt?
   a. It is beautiful.
   b. It could be salt.
   c. I'm not sure what it is.
   d. It is solid, square, and clear.

3. You can describe fabric as rough, fuzzy, smooth, or silky. Which property of matter is this?
   a. Density.
   b. Shape.
   c. Mass.
   d. Texture.

4. A student wants to make a shelf that will display some objects in her room. She needs to decide which material would make the best shelf. She also wants to be sure the shelf will securely hang on the wall. She needs to make sure the shelf will both fit all her things and safely hold up what she wants to put on it. Which characteristics of the shelf's matter are critical for her to measure? Choose all that apply: ....
   a. length
   b. color
   c. mass
   d. texture

5. When paper is burnt, ash that is formed ....
   a. has the same properties of paper
   b. has different properties of paper
   c. represents the flammability of paper
   d. (b) and (c)

6. .... is the measure of how quickly the particles in a substance are moving.
   a. Running
   b. Temperature
   c. Matter
   d. Mass

7. Which of the following is an example of physical properties?
   a. Ability to burn.
   b. Ability to rust.
   c. Change in color.
   d. Round.

8. All of the following are from the chemical properties of matter, except ....
   a. ability to react with another
   b. size
   c. flammability
   d. rusting

9. .... changes describe how matter interacts with another matter.
   a. Chemical
   b. Physical
   c. Melting
   d. Breaking



10. Mass is a measurement of ....
    a. the odor of matter
    b. the length of matter
    c. the amount of matter
    d. the color of matter
11. Volume is the amount of .... that matter takes up.
    a. time
    b. space
    c. temperature
    d. water
12. All of the following are measuring units of volume, except ....
    a. ml
    b. L
    c. Kg
    d. cm^3
13. Electric wire is usually made up of copper, ...
    a. because copper is a bad conductor of heat
    b. because copper is a good conductor of heat
    c. because copper is a bad conductor of electricity
    d. because copper is a good conductor of electricity
14. Electrical wires are usually covered with a layer of plastic, because ....
    a. it helps electricity flow along the wire
    b. it doesn't allow electricity to pass through it
    c. it makes the electric wires safe
    d. (b) and (c)
15. A wooden stick and metal stick are soaked in boiling water, which of them will conduct heat?
    a. Metal stick.
    b. Wooden stick.
    c. Both of them.
    d. No correct answer.
16. Glass is used in making windows, as it is ....
    a. transparent
    b. easy to be shaped
    c. strong
    d. All the previous answers

2 Complete the following sentences using words between brackets:

1. A .... is used to measure the dimensions of your class. (measuring tape – measuring cup)
2. We can distinguish between two brown powders by their .... (texture – color)
3. The temperature of boiling water is measured by a .... (scale – thermometer)
4. Flammability means the ability .... (to burn – not to burn) and it is a .... (physical – chemical) property.
5. The ability of matter to be stretched into thin wires, is a .... property. (chemical – physical)
6. Iron is attracted to the magnet. This is an example of a .... property. (physical – chemical)

PRACTICE

7. Rubber is used to make the bottom of the sneakers, as it has .... as a physical property. (flexibility – heat conduction)
8. 3 kilograms = ... grams (300 – 3000)
9. Mass of your body could be measured by .... (balance – kg)
10. The unit that is used to measure the volume of chemicals used during experiments is .... (milliliter – gram)
11. .... is used in making electric wires. (Rubber – Copper)
12. Helium has .... density than air. (less – more)
13. When the molecules of matter are ...., then this matter has low density. (spread out – tightly packed)

3 Put (✓) or (✗) in front of each sentence:

1. All forms of matter have the same chemical and physical properties. (
2. Materials that absorb the thermal energy coming from the sun, is the best for desert houses roofing material. (
3. One kilogram is equal to 1000 mL of water. (
4. Matter has volume and mass. (
5. Gas has mass. (
6. Rusting of iron, is one of its chemical properties. (
7. Helium and oxygen gases, both are in the same state, so all their physical properties are similar. (
8. Wood is used in making handles of cooking pans, as it is a good conductor of heat. (
9. When the volume of matter increases, its density increases. (
10. Cutting of wood into pieces changes its mass and density. (

4 Write the scientific term for each of the following:

1. A property of matter you can observe when it changes into a different substance. (.................)
2. A measure of the amount of matter in an object. (.................)
3. The amount of space that matter takes up. (.................)
4. A material that allows an electric current to pass through it easily. (.................)
5. A material that allows heat to pass through it easily. (.................)

5 Look at the following figures, then answer:

(A) Tick "True" or "False":

1. Oil has the greatest density.
   True ☐ False ☐
2. Milk is less dense than water.
   True ☐ False ☐
3. Oil is less dense than water.
   True ☐ False ☐
4. Oil and honey have the same density but different masses.
   True ☐ False ☐

Density of liquids

(B) 1. Which matter has more density?

....

....

2. Why?

....

....

Material (A) Material (B)

(C) This is called a "simple electric circuit." We placed cubes made of different materials in the electric circuits (A) and (B).

1. The lamp lights up in the electric circuit (A) because the cube is made of .... (iron – glass), which is a .... (good – bad) electric conductor.
2. The lamp doesn't light up in the electric circuit (B) because the cube is made of .... (wood – copper), which is a .... (good – bad) electric conductor.

Simple electric circuit (A)

Simple electric circuit (B)



6 Answer the following questions:

(A) Read the text. Underline the words and phrases that describe the properties that make cardboard a good choice for making a box.

All materials have advantages and disadvantages. Materials may be strong or weak. Some materials are better for some uses than others. Heavy rocks and metals work for many uses. Paper and cardboard work for other uses. Cardboard is a better material for a box than glass. Cardboard is thin and flexible. However it can get ruined if it gets wet. Because cardboard is not rigid, it is easy to cut and fold. However, it may break when it is used to hold very heavy items.

(B) Handles of electric screws are made of plastic. Why?

....

(C) Radwa bought some cooking pots that are made of metals like copper, and their handles are made of wood or plastic. Why?

....

(D) Helium is one of the gases that are found in the atmosphere.

Write the uses that are related to the following properties.

1. It has lower density than air: ....
2. It is not poisonous: ....

(E) A piece of cork and a nail have the same mass but the piece of cork can float on water, while the nail sinks. Explain.

....

1 Choose the correct answer:

1. Flammability is a/an ....
   a. chemical property
   b. physical property
   c. liquid
   d. unobservable property
2. The space that is taken up by object is ....
   a. density b. volume c. mass d. length
3. Some forms of matter can float over water, because ....
   a. their molecules are tightly packed
   b. they are heavier than water
   c. their molecules are spread out
   d. All the pervious answers
4. .... is used to measure volume of liquids.
   a. Measuring tape b. Measuring cup c. Ruler d. Scale
5. Rubber is used to make gloves, as it is ....
   a. hard
   b. flexible
   c. transparent
   d. good conductor of electricity

2 (A) Complete the following sentences using words between brackets:

1. Blimps can float in the air, as they are filled with .... (helium – oxygen)
2. Mass of jewelry is measured in .... (kilogram – gram)
3. .... properties of matter are observed when a new matter is formed. (Physical – Chemical)

(B) Cross out the odd word:

1. Color – Rusting – Texture – Odor. (..............................)
2. Copper – Iron – Plastic – Aluminum. (..............................)

3 (A) Put (✓) or (✗) in front of each sentence:

1. 1 Gram (g) = The mass of a paperclip. (   )
2. Wood is not attracted to the magnet. (   )
3. The properties of matter help us determine its suitable uses. (   )

(B) Write the scientific term of each of the following:

1. A physical property that determines whether matter will float or sink. (..............................)
2. An electric conductor material that is used in making electric wires. (..............................)

Concept 3

Comparing Changes in Matter

Concept Objectives

By the end of this concept, the student will be able to:

- Explain the relationship between changes in temperature, states of matter, and mass.
- Identify the causes of changes in the physical and chemical properties of matter.
- Investigate what happens when two or more substances are mixed.
- Classify mixtures and compounds based on what happens when they are combined.





WONDER



Lesson 1



Activity 1 Can You Explain?

- We have previously learned that matter exists in three states (solid, liquid, and gas).
- Matter can be changed from one state to another.

Temperature Effect

▸ When you put a cup of juice in the freezer, the ....

juice remains liquid as it is ☐ juice turns into ice ☐

temperature of the juice increases ☐

▸ When 1 kg of ice turns into liquid, its ....

mass remains as it is ☐ mass decreases ☐

mass increases ☐

So, changing temperature affects the shape and the state of matter.

What happens to the mass of a substance when it is heated, cooled or mixed with other substances ?

- The mass of the substance does not change when it is heated or cooled.

Examples

- When we heat 100 grams of ice cubes (**solid**), they change into 100 grams of water (**liquid**).

100.0 g — "Before heating"

By Heating

100.0 g — "After heating"

Parents' Tips

Help your child understand how changing temperature affects the shape and the state of matter

Temperature	درجة الحرارة
Affect	تؤثر





Activity 2 Melting Matter

- Which of the following factors leads to ice melting in the polar region?

Low temperature ☐ High temperature ☐



Melting

- Matter can be changed from a solid state into a liquid state, such as:


Ice (solid state)




Water (liquid state)

- There is a relation between temperature and the speed of melting:

Heating a substance increases its temperature.


"Melting Butter"

So, as the temperature of the substance increases, it melts faster and vice versa.

What would happen if we left a bowl of water on a hot plate overnight





- The water will evaporate (water "liquid state" changes into vapor "gaseous state").

Search the internet

- What is the temperature needed to keep the ice in its solid state without melting?

Checkpoint



Put (✓) or (✗) in front of each sentence:

1. Solids can change into liquids by cooling process. ( )
2. The mass of a substance changes by heating or cooling. ( )

Parents' Tips

Help your child understand the effect of temperature on changing matter states.

Bowl of water	وعاء ماء
Melting	انصهار



Activity 3 What Do You Already Know About Changes to Matter?

- We have previously learned that matter is anything that has mass and takes up space.
- Each kind of matter is made up of tiny particles that are in continuous motion.

States of Matter

Look at the following pictures, then identify the state of matter in each picture and circle the correct answer:

A



1. Wood is in a .... state.
2. Its particles are (loose – not held close together – closely packed).
3. Its particles (vibrate – move faster – move freely).
4. Its particles (take – do not take) the shape of the container.

B



1. Water is in a .... state.
2. Its particles are (loose – not held close together – closely packed).
3. Its particles (vibrate – move faster – move freely).
4. Its particles (take – do not take) the shape of the container.

C

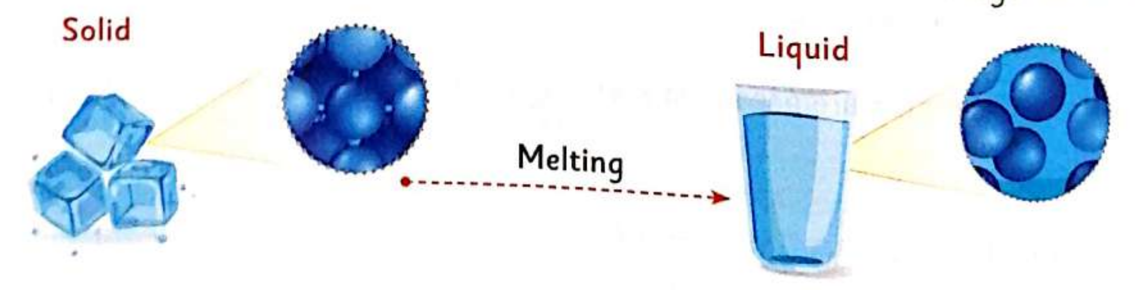


1. Air inside the balloon is in a .... state.
2. Its particles are (loose – not held close together – closely packed).
3. Its particles (vibrate – move faster – move freely).
4. Its particles (take – do not take) the shape of the container.

Does the amount of matter (particles) change by changing the state of matter



- When the matter changes, the total number of particles in the matter stays the same.



The number of particles of a solid state = The number of particles of a liquid state

Parents' Tips

Help your child understand that the changing of matter from one state to another doesn't affect the number of its particles.

Particles جزيئات
Amount كمية






4 Activity

Particles

- The form of energy that helps us warm our homes is called ....

  electric energy ☐ thermal energy ☐

Thermal Energy

- It is a form of energy we use every day, such as:


"Warming houses"


"Cooking food"


"Boiling water"


"Drying Clothes"

- It is not a physical thing or material; but it is a form of energy.
- Thermal energy is also called "Heat energy".


Note The Sun is the main source of heat energy, which keeps living organisms on Earth alive.



Particles in Motion

- We have learned that matter is made up of tiny particles that are in a continuous motion:



Example:

A Hot Cup of Tea

- Tea, like all matter, is made of tiny particles.
- These particles have energy that allows them move, vibrate and spin around.


Parents' Tips

Help your child understand the effect of heat energy on the motion of the particles of matter.





- When a kind of matter absorbs "Light or Thermal energy", its particles move, vibrate and spin faster.
- The faster the movement, the more thermal energy the object has.

The more the water is heated.





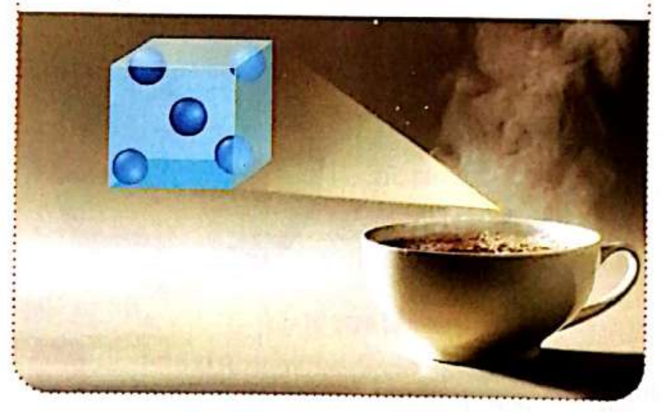
The more the particles move.

"Boiling water"

Let's discover what happens to the particles in a cup of tea when they are warmed up and cooled down.

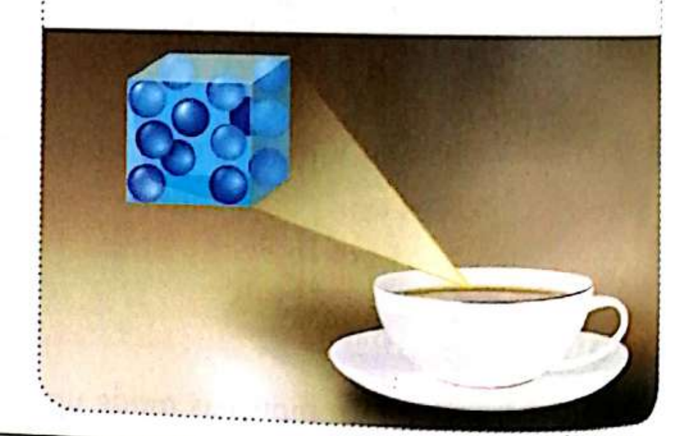
Warmed-up tea

- Particles move faster and spread out.
- Particles are away from each other and bump into one another.



Cooled down tea

- Particles move more slowly and come closer together.



Checkpoint

Complete the following sentences using the given words:

(faster – solid – slower – continuous – Gas – gain – lose)

1. When the particles of matter .... energy, they move and spin faster.
2. Matter particles are in a .... motion.
3. When matter particles are warmed up, they move ....
4. .... particles move freely in all directions.

Absorb	يمتص	Continuous motion	حركه مستمره
Vibrate	تهتز	Spin around	





Lesson 2



Activity 5 Hands-On Investigation: Changing States of Matter

• When you put a piece of chocolate in your pocket, it ....

stays as it is ☐ melts ☐



Changing States of Matter

Let's conduct an experiment to explore how substances behave under different temperatures.



Aim: The effect of heating and cooling on matter states.

Caution!! Follow the lab safety guidelines while performing an experiment.

Materials: Plastic resealable bags – Small pieces of chocolate – – heat source – ice cubes in a small bowl.

Steps	Illustration
1 Place the bag of chocolate pieces in the sun.	
2 Wait about 5 minutes and record your observations.	
3 Repeat this step every 5 minutes until the chocolate melts.	
4 Place the bag of the molten chocolate in a small bowl of ice.	
5 Wait about 5 minutes and record your observations.	
6 Repeat this step every 5 minutes until the chocolate freezes.	

Observation:

State of Matter	After 5 minutes	After 10 minutes	After 15 minutes
Solid chocolate	- Some of the chocolate pieces started to melt.	- Most of the chocolate pieces melted, and their shapes changed.	- All chocolate pieces melted and changed into liquid state.
Liquid chocolate	- Some of the chocolate pieces started to freeze.	- Most of the chocolate pieces froze, and their shapes changed.	- Chocolate pieces froze and changed into solid state.

Conclusion:

1. The solid state can change into liquid state by heating (increasing temperature).
2. The matter can be returned from the liquid state to the solid state by cooling (decreasing temperature).

Parents' Tips

Help your child conduct this experiment that shows the effect of changing temperature on states of matter.

resealable bags اكياس قابلة للاغلاق





6 Activity — Temperature and State of Matter

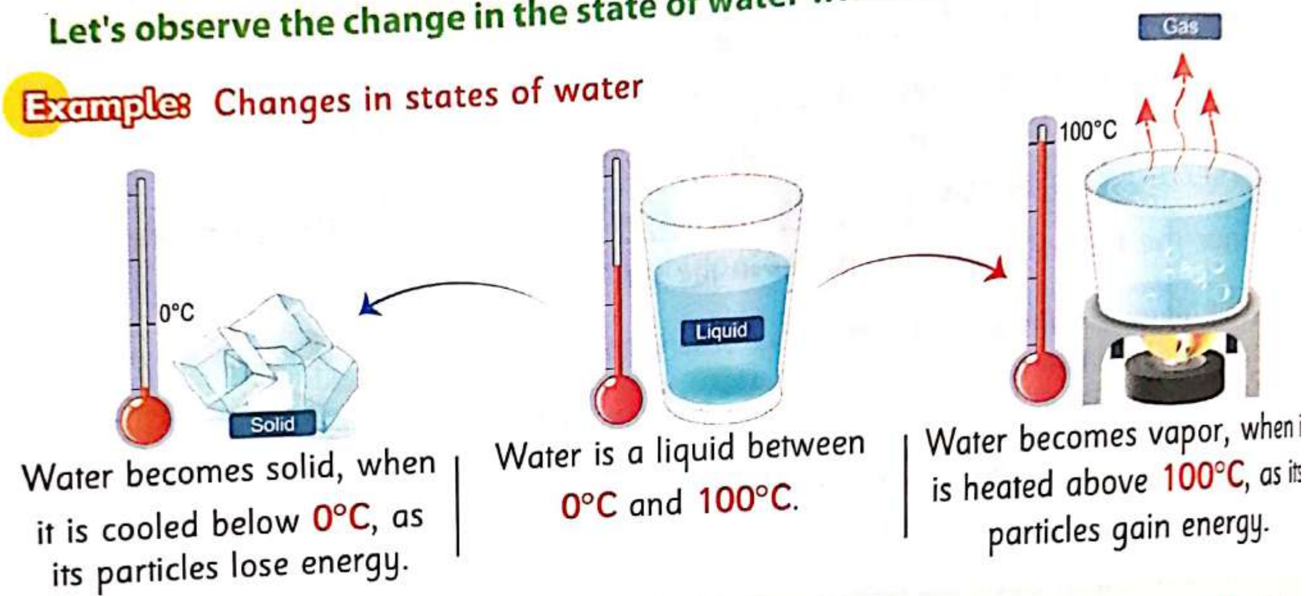
- We have previously learned that when matter absorbs heat energy the particles of the matter move and vibrate faster.

The relation between Temperature and States of Water

- The state of a substance depends on its temperature.
- The temperature of a substance is a measure of how much energy the particles in the substance have.

Let's observe the change in the state of water with different temperature...

Example: Changes in states of water



Water becomes solid, when it is cooled below **0°C**, as its particles lose energy. | Water is a liquid between **0°C** and **100°C**. | Water becomes vapor, when it is heated above **100°C**, as its particles gain energy.

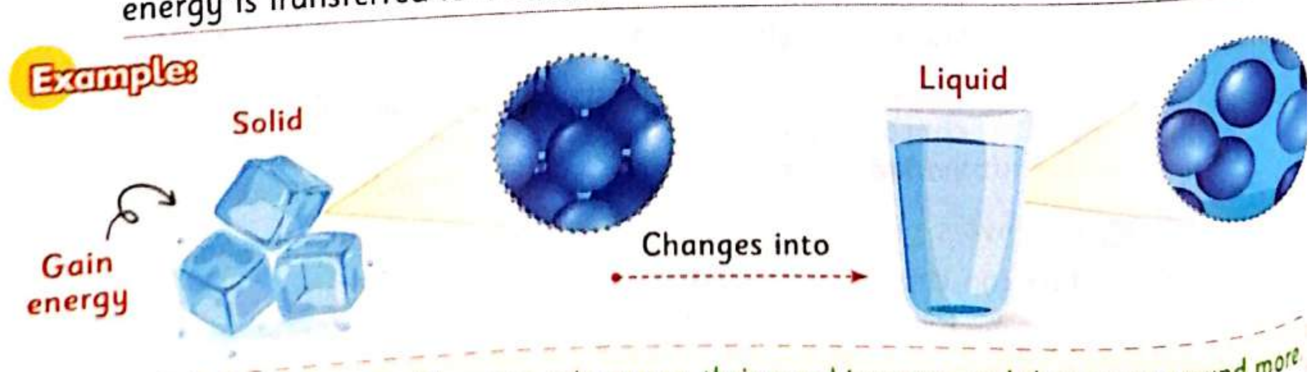


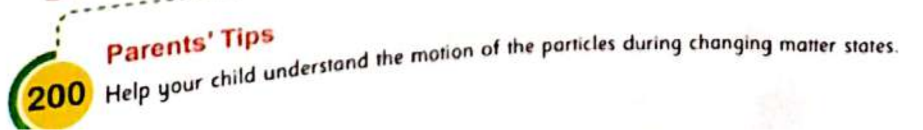
- Zero degree Celsius (0°C) is the **freezing point** of water and **melting point** of ice.
- 100°C is the **boiling point** of water.

Melting

It is the change of matter from solid state (ice) to liquid state (water), when energy is transferred to the solid.

Example:





Parents' Tips

Help your child understand the motion of the particles during changing matter states.

Melting point	درجة الانصهار
Freezing point	درجة التجمد
Boiling point	درجة الغليان



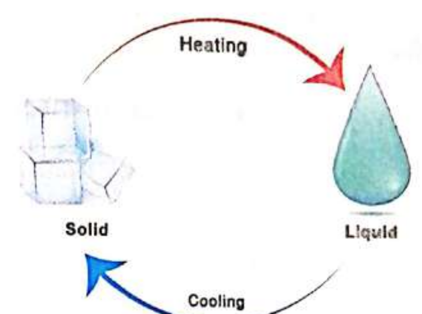
Physical Changes

- Changes of state are often caused by changes in temperature.

Physical (reversible) change

- It is a changing of matter that doesn't change the components of substances.

Example: "Melting Ice cubes"



- Melting is a physical change that can be reversed by cooling liquid (water) until it freezes again.
- Where the water is still water, even though it looks different.



Increasing or decreasing temperature can also cause chemical changes, such as burning a piece of paper.

Checkpoint

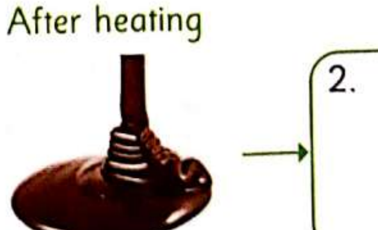
(A) Choose the correct answer:

1. When ice cubes gain energy, they change into ....
   a. liquid b. gas c. remains as it is
2. Physical changes don't change the .... of the substance.
   a. shape b. component c. Both (a) and (b)
3. Changing temperature causes .... of matter.
   a. only physical change b. only chemical change c. Both (a) and (b)

(B) Draw in the following empty boxes the particles of the piece of chocolate before heating and after heating:

Before heating After heating

1.



2.



Lesson 3



- Ice is the .... state of water, while vapor is the .... state of water.

liquid - solid ☐ solid - gas ☐

Matter States

- Water can exist in three states: solid, liquid, or gas in room temperature.



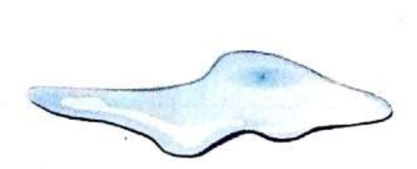
solid



"Ice is the solid state of water"



Liquid





Gas



"Vapor or steam is the gaseous state of water"

- Water states can change from one state to another by **heating or cooling**, such as:

While Heating

- When the temperature goes up, the particles gain energy and vibrate a lot more (or bounce around).
- The extra energy allows the particles to change to a different state.



While Cooling

- When the temperature goes down, the particles will lose energy, slow down, and move together.
- The loss of energy allows the particles to change to a different state.



Parents' Tips

Help your child understand how matter can change from one state to another.



Changing States of Matter

Let's observe the four main processes that help change of matter states

Solid — Melting → Liquid — Evaporation → Gas

Solid ← Freezing — Liquid ← Condensation — Gas

1 Melting Process

- It is the change of matter from solid state to liquid state, when solid matter gains heat energy (by heating).
- As the particles of matter gain energy and move more freely.


Ex. Melting ice cubes.



2 Freezing Process

- It is the change of matter from liquid state to solid state, when liquid matter loses heat energy (by cooling).
- As the particles of matter lose energy and move more slowly.

Ex. Putting a water bottle in the fridge.



3 Evaporation Process

- It is the change of matter from liquid state to gaseous state, when liquid matter gains heat energy (by heating).
- As the particles of matter gain energy and move faster.


Ex. Heating water.



4 Condensation Process

- It is the change of matter from gaseous state to liquid state, when gas matter loses heat energy (by cooling).
- As the particles of matter lose energy, and move more slowly.

Ex. Condensation of water vapor on a glass window.



Melting	انصهار	Evaporation	تبخر	Condensation	تكثف
Freezing	تجمد	Gain	يكتسب	Lose	يفقد





Learn Exercise 1



1 Choose the correct answer:

1. The temperature affects the .... of the matter.
   a. shape only
   b. state only
   c. number of particles
   d. (a) and (b)
2. .... is the solid state of water.
   a. Water
   b. Ice
   c. Steam
   d. Water vapor
3. Which of the following is an example of changing of solid into another state of matter?
   a. Breaking a chair into pieces.
   b. Melting a piece of wax.
   c. Cutting a piece of paper.
   d. Water freezing.
4. What will happen to the ice cream if it is left on a table overnight?
   a. The ice cream will be a gas.
   b. The ice cream will stay a solid.
   c. The ice cream will be a liquid.
   d. The ice cream will disappear.
5. When something freezes, it changes from a .... state to a .... state.
   a. gas - solid
   b. solid - gas
   c. liquid - solid
   d. liquid - gas

2 Complete the following sentences using the given words:

(melts – slower – speeds up – faster – 0°C –100°C)

1. When an energy is transferred to a solid state, it .... and the motion of particles becomes ....
2. When particles of matter are cooled down, they move ....
3. The freezing point of water is ...., while its boiling point is ....
4. When a piece of chocolate gains energy, its particles .... and becomes a liquid.

3 Put (✓) or (✗) in front of each sentence:

1. The mass of a substance stays the same after heating. ( )
2. As the temperature of the solid matter decreases, it melts faster. ( )
3. Water can turn into all the three states of matter. ( )
4. There is an inverse relationship between the temperature and the melting speed. ( )





8 Activity — Real-World Mixtures



- Look at the opposite figure of the green salad, then write down four components of it.

1. .... 2. .... 3. .... 4. ....

Mixtures

- Mixtures are all around us. The air we breathe and some of the food we eat are mixtures.
- Mixtures are used in cooking, building materials, and combining many materials into one product.

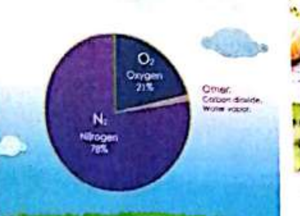


Mixture

It is a form of matter made of two or more different components that are not chemically combined.

Examples:

1. Air (atmosphere)



It consists of different gases such as Nitrogen and Oxygen.

2. Fruit salad



It consists of different fruits, such as banana and strawberry.

3. Ocean water

It consists of water and salts.

4. Pink granite



It consists of different minerals with different colors.

Checkpoint



Put (✓) or (✗) in front of each sentence:

1. Mixtures are made of similar materials. (   )
2. Salt is a mixture. (   )
3. Orange juice is a mixture. (   )
4. All components of mixtures are solid only. (   )

Parents' Tips

Help your child identify the different mixtures around us.

Mixtures	مخاليط
Combine	دمج
Components	مكونات





- In a green salad, can you separate the tomatoes from the other components? Yes ☐ No ☐



Types of Mixtures

- Mixtures can occur in all states of matter, and sometimes involve combining materials in two different states:

Types of Mixtures

1 Solid-solid mixture

- It consists of two or more different solid materials.

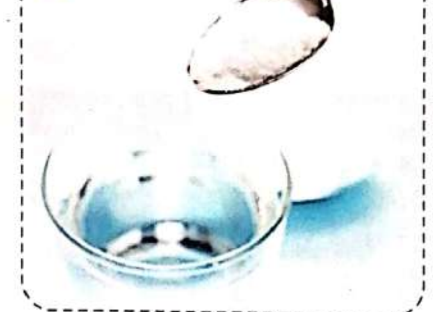
Ex. Mixture of sand and small rocks.



2 Solid and liquid mixture

- It consists of solid and liquid materials.

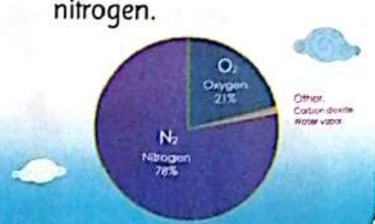
Ex. Salty water.



3 Gases-gaseous mixture

- It is a mixture of different gases.

Ex. The atmospheric air is a mixture of different gases such as oxygen and nitrogen.



Properties of Mixtures

The main properties of mixtures are

1

- The components of mixtures are physically combined (don't react with each other).



Ex. Oil and water don't react together, and we can differentiate between them.



2

- Components of mixtures can be separated easily from each other.



Ex. We can separate a piece of lettuce out of the green salad.



3

- In mixtures, each component keeps its physical properties (identity) such as color, taste, and odor.



Ex. Sugar does not lose its sweetness when it is mixed with water.



Parents' Tips

Help your child identify the different properties of mixtures.

React — يتفاعل

Atmospheric air — الهواء الجوي



What is the difference between mixtures and compounds



The Mixture

- It is made of two or more components mixed together physically.
- Its components can be separated easily by physical ways.

Ex. Salt water (which is produced by dissolving salt in water).



The Compound

- It is made of two or more components combined together chemically to form a completely new substance.
- Its components can be separated by chemical ways.

Ex. Pure water (which is produced from the chemical combination between oxygen and hydrogen).



Separating Mixtures

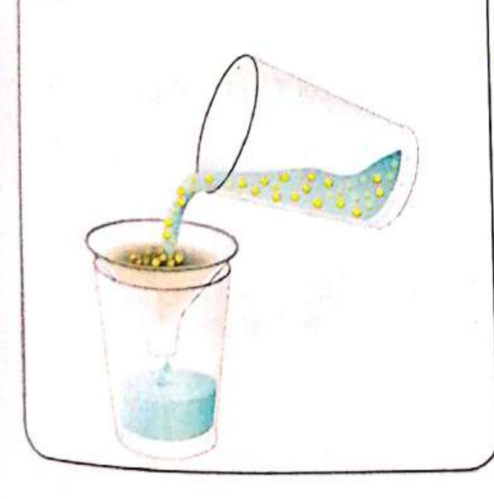
- The components of a mixture can be separated easily by simple methods because they do not react together.



1. Using filter paper (filtration)

- It is used when one material has smaller particles than the other.
- It separates mixtures of insoluble solid materials and water.

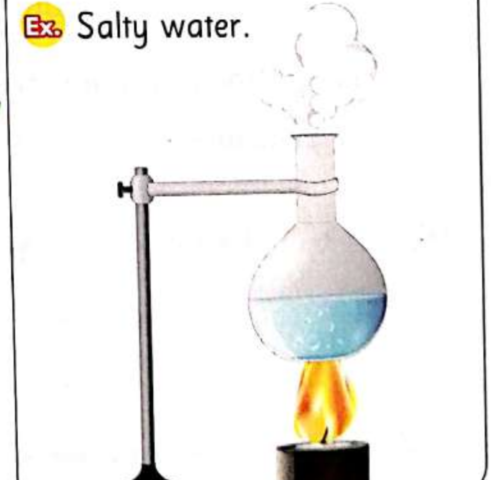
Ex. Sand and water.



2. Evaporation process

- It is used when mixtures have materials evaporate at different temperature.
- It separates mixtures of soluble solid materials and water.

Ex. Salty water.



Filtration	الترشيح	Filter paper	ورقة ترشيح	Insoluble	لا يذوب
Soluble	يذوب	Compound	مركب		





- We can use a magnet to separate a mixture of sand and metal paper clips.
- We can easily distinguish the different components of the solids mixture such as a nuts mixture, but we need special equipment to see a gases mixture such as "air atmosphere".





Checkpoint

(A) Choose the correct answer:

1. What is mixture?
   a. A physical combination of 2 or more materials.
   b. A chemical combination of 2 or more materials.
   c. A place where people live.
   d. Both (a) and (c).
2. What is a compound?
   a. A physical combination of 2 or more materials.
   b. A chemical combination of 2 or more materials.
   c. A place where people live.
   d. Both (a) and (c).
3. All the following are mixtures except ....
   a. cement b. sugary water c. sugar d.fruit salad

(B) Look at the opposite figure, then answer:



1. The components of this mixture are:
   a. .... b. ....
2. All components of this mixture are in a .... state.



Lesson 4



10 Activity Hands-On Investigation: Mixing it up with Mass

- What happens to the mass of the mixture after mixing two or more substance together?

Experiment Time

The mass of mixture equals the masses of the materials before mixing. ☐

The mass of mixture is more than the masses of the materials before mixing. ☐

The mass of Mixtures



Aim: Find out the sum of the masses after mixing two substances together.

Caution!! Follow the lab safety guidelines while performing an experiment.

Materials: Balance – Spoons – Dishes – Cornstarch – Vinegar – Lemon juice – Baking soda – Flour – Disposable gloves – Plastic bags.

- **Part 1: Mixing Solids.**

Steps	Illustration
1 Measure the mass of two solid substances (cornstarch - flour) using the balance.	
2 Measure the mass of a resealable plastic bag and record it.	
3 Add the two solids into the plastic bag and close it.	
4 Mix the two solids with your hand by massaging the bag from the outside.	
5 Find the mass of the plastic bag that contains the two solids and record it.	

- **Part 2: Mixing Liquids.**

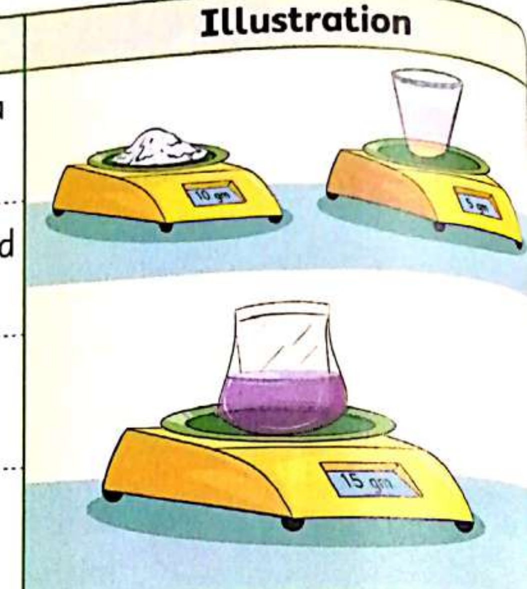
Steps	Illustration
1 Measure the mass of two liquid substances (vinegar - lemon juice) using balance.	
2 Add the two liquids into the plastic bag and close it.	
3 Mix the two liquids with your hand by shaking the plastic bag.	
4 Find the mass of the plastic bag that contains the two liquids and record it.	

Parents' Tips

Help your child conduct an experiment to calculate the mass of the mixture components before and after mixing them together.



• Part 3: Mixing Solids and Liquids.

Steps	Illustration
1 Measure the mass of a solid (Baking soda) and a liquid (vinegar) substance using balance.	
2 Add the solid and the liquid to the plastic bag and close the bag.	
3 Mix the solid and the liquid substances with your hand by shaking the plastic bag.	
4 Find the mass of the plastic bag that contains the solid and the liquid and record it.	

Observation:

Mixtures	Substances	The mass before mixing (gm)	The mass after mixing (gm)
Solid mixture	1. Cornstarch 2. Flour	1. 10 grams 2. 20 grams	30 grams
Liquid mixture	1. Lemon juice 2. Vinegar	1. 5 grams 2. 5 grams	10 grams
Solid -liquid mixture	1. Baking soda 2. Vinegar	1. 10 grams 2. 5 grams	15 grams

Conclusion:

• The mass of the mixture is the sum of the masses of the substances that make the mixture.

What happened to the properties of the substances when they were mixed 

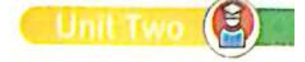
1. If the two substances didn't react with each other, they would keep (retain) their physical properties, such as mixing cornstarch with flour.

2. But if the two substances react with each other, their physical properties change, such as:

   a. mixing of baking soda and vinegar which forms a new substance as there is a gas formed, causing bubbles.

   b. mixing of iodine to the cornstarch which forms a new substance with a blue color.





Lesson 5 — Activity 11 Properties of Mixtures

- We have previously learned that Mixtures are made up of two or more substances mixed together.

Properties of Mixtures

1. Read the following sentences, then tick the one that represents a description of the properties of mixtures:

a. Mixtures are made of components that can be separated. ☐

b. Mixtures are made of only one kind of substance. ☐

c. Mixtures are formed physically by combining two or more substances. ☐

d. Mixtures are made of components that cannot be physically separated. ☐

e. Mixtures can be liquid, gases or solids. ☐

f. Mixtures are made of components that react chemically with each other. ☐

2. Look at the following figures, then circle the correct answer:

Pink granite



Ocean water



Atmosphere



a. Pink granite is a mixture because it consists of different minerals with (different – similar) colors.

b. Ocean water is a (salty – pure) water, and has a variety of living organisms.

c. Atmosphere is a mixture of (visible – invisible) gases.

Parents' Tips

Help your child examine his/her knowledge of mixtures and their properties.

Activity 12 Physical Changes in Our Lives

- Which change causes the change in the shape of the sugar only?

Dissolving sugar in water. ☐

Burning sugar and turning it into caramel. ☐

Physical Changes

- Changes are happening all around us every day.
- They change the size, shape, or state of matter.
- They don't result in a new substance.



Physical change (reversible change)

It is a change in the shape of the matter only without changing in its properties.

Examples:

1



- Cutting cloth when making clothes.

2



- Melting Wax.

3



- Cutting fruits and vegetables to make salad.

4



- Shaping wood and metals.

5



- Dissolving a table salt or sugar in water.

6



- Grinding of sugar and chalk.

7



- The ice cycle (Water changes from a state to another state by heating or cooling).



Most physical changes can be reversed easily, such as the molten chocolate can be solidified again.

Parents' Tips

Help your child identify the physical changes around him/her.

Dissolving	ذوبان
Grinding	طحن
Solidified	تصلب

Activity 13 Chemical changes in Matter

- Which change causes the change in the shape and structure of an egg?

Breaking the egg ☐ Boiling the egg ☐

Chemical Changes

- When matter changes and forms a new substance, it is called a chemical change.

Let's observe the changes that occurred on a piece of paper to understand what a chemical change is.

Cutting the paper into small pieces



- The shape and size of the paper changes, but it is still a piece of paper.

(It is a physical change.)

Burning the piece of paper



- The shape and the structure of the paper changes and a pile of ashes is formed.

(It is a chemical change.)

Chemical change (irreversible change)

It is a change in the shape and the structure of matter producing a new substance with different properties.

Examples:

1.



- Mixing vinegar and baking soda produces gas bubbles of carbon dioxide.

2.



- Burning of a match stick produces heat and light.

3.



- Making bread produces gas bubbles when yeast is added to the dough.

Parents' Tips

Help your child identify the chemical changes around him /her.

Irreversible change	تغير غير عكسي
Yeast	خميره
Dough	عجينه





Lesson 6



Look at the following figure, then answer:

- Burning of wood is considered a .... change.

chemical ☐ physical ☐

- After burning wood, new substances are formed, such as ....

coal and ash ☐ bubbles ☐

Chemical Changes

- In chemical changes; two or more materials are combined, and a new substance is formed.
- The new substance is different physically from the original substances, which means it is different in (color, taste, and odor).
- The new substance also has different chemical properties and can't return back to the original form.

Examples:

1. When a wet piece of iron is exposed to air (oxygen), they combine together to form rust, such as the rusting of iron nails.
(Rust is a flaky - reddish called iron oxide)



2. When oxygen combines with carbon and hydrogen, they release heat that can start a fire, such as the burning of wood.



Parents' Tips

Help your child understand the properties of materials that that are formed chemically.



3. Food is digested into new substances by the chemicals that are produced in our bodies.

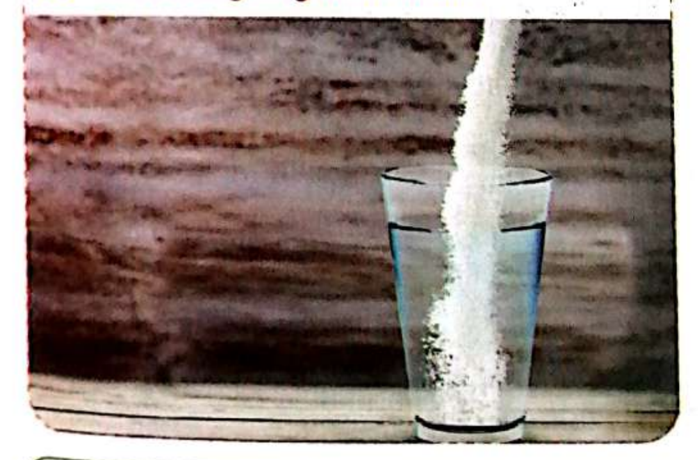


Let's compare between physical changes and chemical changes.

Physical change

- It is a change in the shape and the size of matter only without forming a new substance.
- The matter may be back to the original form so it is a reversible change.
- It doesn't change the properties of matter.

Ex. Dissolving sugar in water



Chemical change

- It is a change in the shape and the structure of matter producing a new substance with different properties.
- The new substance can't return back to the original form so it is irreversible change.
- It changes the properties of matter.

Ex. Burning of sugar.



Checkpoint

Classify the following changes into "physical change" and "chemical change":

1. Changing a cube of ice into water. (..............................)
2. Burning a piece of paper. (..............................)
3. Melting of a piece of chocolate. (..............................)
4. Making yoghurt from milk. (..............................)
5. Rusting of iron. (..............................)

Flaky reddish قشره حمراء | Iron Oxide اكسيد الحديد | Rust صدا





15 Activity — How Has It Changed?

- We have previously learned that matter can be changed physically or chemically.

Look at the following changes, then choose whether it is a physical or chemical change and why.

The change	Illustrated figure	Type of change	The evidence
1 Coiling a piece of wire to form a spring		Physical change ☐ Chemical change ☐	Changing in the shape ☐ Changing in the color ☐
2 Burning a piece of bread		Physical change ☐ Chemical change ☐	Changing in the color ☐ Changing in the state ☐
3 Melting a piece of butter		Physical change ☐ Chemical change ☐	Formation of gas bubbles ☐ Changing in the state ☐
4 Rusting of nails		Physical change ☐ Chemical change ☐	Formation of rust ☐ Producing light ☐
5 Frying an egg		Physical change ☐ Chemical change ☐	Formation of a new substance ☐ No new substance is formed ☐
6 Adding food coloring to a cup of water		Physical change ☐ Chemical change ☐	Formation of a new substance ☐ New substance is not formed ☐

Parents' Tips

Help your child differentiate between physical and chemical changes by detecting some evidence.



1 Choose the correct answer:

1. Which of the following explains the meaning of a mixture?
   a. A combination of substances to make a new form.
   b. Chemically combined substances.
   c. A combination of substances where a new substance is formed through a reaction.
   d. A combination of substances in which the particles of the substance do not chemically combine.
2. All the following are mixtures except ....
   a. bread b. table salt c. soil d. seawater
3. The color of cucumber in a green salad is still ....
   a. red b. green c. orange d. yellow
4. Sugary mixture is a .... mixture.
   a. solid-liquid b. gas c. liquid d. No correct answer
5. All the following are used to separate mixtures except ....
   a. stirring b. filtration c. magnet d. evaporation
6. Which of the following mixtures has invisible components?
   a. Nuts. b. Fruit salad. c. Air. d. Sugary water.
7. Filtration is used to separate a ....
   a. liquid mixture b. solid mixture
   c. solid-liquid mixture d. All the previous answers
8. Matter can be changed ....
   a. chemically only b. physically only
   c. automatically d. (a) and (b)
9. Which of the following is a sign that a chemical reaction has occurred?
   a. Change in shape. b. Melting.
   c. Formation of a gas. d. Dissolving.
10. Which change is making a change in matter structure?
    a. Physical change. b. Chemical change.
    c. Shaping. d. Melting.



2 Complete the following sentences using words between brackets:

1. Evaporation is used to separate any matter .... in water. (dissolved – not dissolved)
2. Mud and water is a .... type of mixture. (solid-liquid – liquid-liquid)
3. Mixing of baking soda and vinegar is a .... change. (physical – chemical)
4. To detect the presence of starch, ... is used and gives blue color. (iodine – baking soda)
5. Burning of wood is a .... change. (physical – chemical)

3 Write the scientific term for each of the following:

1. A substance that contains more than one type of different components. (....................)
2. It is a type of mixtures that consists of different gases. (....................)
3. The change in which the substance returns back to its original shape. (....................)

4 Put (✓) or (✗) in front of each sentence:

1. All components of mixtures are liquid only. ( )
2. In green salad, we can separate the tomato from the salad easily. ( )
3. You can see the different components of the salty water. ( )
4. Physical changes affect the properties of the substance. ( )

5 Classify the following into physical changes and chemical changes:

The change	Illustrated figure	Type of change
1. Hammering wood		....
2. Crumpling paper		....
3. Pencil sharpening		....





SHARE



Lesson 7





Activity

- You have learned about melting solid matter into a liquid.
- Now, you can write a scientific explanation, act like a scientist and follow the scientific method.
- Answer the "**Question**" from "**Can You Explain?**" activity, then share what you have learned with your classmates.



Question:

What happens to the mass of a substance when it is heated, cooled or mixed with other substances?

Claim:

- The mass of a substance does not change when the substance is heated, cooled, or mixed with other substances.

Evidence:

- We observed that when an ice cube warms and changes to liquid water, the mass remains the same.
- Sometimes matter changes its form and mass escapes into the air as a gas during physical or chemical changes.
- However, if that gas was collected and cooled, the mass would be the same as it is when we started.

Scientific Explanation:

- Temperature is the main factor that causes changes in matter.
- When energy is added in the form of heat, particles move more quickly and spread out.
- When energy is released, the particles slow down and become more tightly packed and organized once again.
- When we mixed substances in different states, the combined mass was equal to the total of the two materials before mixing.





Parents' Tips

Help your child follow the scientific method to write a scientific explanation using evidence to support a claim.







SHARE



Lesson 7





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Parents' Tips

Help your child follow the scientific method to write a scientific explanation using evidence to support a claim.









Plenty of Water, but None to Drink

- Some people are in danger of dying from thirst although they have water all around them.
- The reason of this danger: they can't just take a big sip from the sea as drinking salt water makes a person dehydrate or lose water.
- The solution: Separating the mixture of the seawater enables people to drink the water they need.

A tricky Mixture

- Seawater is a mixture of water, salt, other minerals, gases, living and dead organisms.
- The only material that a thirsty person wants is the fresh water.

How do you separate the water from all the other materials



There are two steps to separate the mixture of seawater which are:



1. Filtration
2. Boiling

First step: Filtration

- Filtration is the way that is used to filter the seawater by removing any large materials in the mixture.

The Filtered materials from the seawater

Seaweed – Shells – Fish – Water – Salt – Minerals – Gases

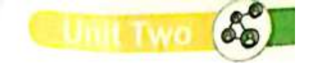
- All the previous materials would still pass through the filter, and the mixture still be undrinkable.



Parents' Tips

Help your child understand the importance of desalination process.

Filtered materials المواد المرشحة



Second step: Boiling of the seawater

- It is performed through three steps which are:



1. The seawater that passes through the filter is boiled, and the water evaporates and rises out while the salts and other minerals stay behind.
2. The water vapor that rises into the air is trapped by using a sponge.
3. When the water vapor cools, it turns back into a liquid, and is safe to drink.

Problem Solver or Problem Starter?

- Many people around the world lack the fresh water, although water covers about 71% of the planet.
- The process of **desalinating** salt water is considered a solution to the problem of fresh water shortage around the world.

Desalination

It is the process of removing salt from water.

Example:

- About 70% of the population of the Kingdom of **Saudi Arabia** obtain drinking water from the desalination process of seawater which provides about 3 billion liters of their needs of water.



Disadvantages of desalination process:

1. Requires a lot of energy.
2. It is very expensive.
3. Pumping the excess salty water back into the ocean can be dangerous to the sea animals.

Trapped محاصر





STEM CHALLENGE

- Based on what you have learned, do research in the following fields: about desalination



1 Science



- The importance of the chemical and physical properties of water to the different environment.

2 Technology



- The development of industry and equipment for desalination and devices used in water treatment.

3 Engineering



- Making a pie chart representing the percentage of salt water and fresh water in the earth's surface.

4 Mathematics



- Calculating the percentage between the population of a country and their basic needs of fresh water.

Information from Unicef

Eating healthy snacks

rich in iron like peanuts, dates and raisins protects you against anemia.





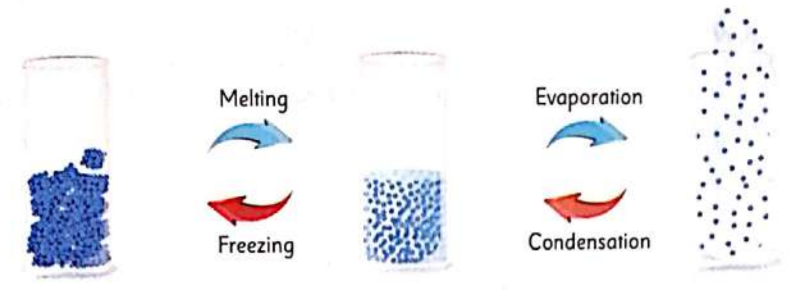
Concept Main Ideas

Concept Summary

- Changing temperature affects the shape and the state of objects.
- Heating matter means increasing in its temperature, while cooling matter means decreasing in its temperature.
- The mass of a substance doesn't change when it is heated, cooled, or mixed with other substances.

Changes of matter:

- Matter can be changed from one state to another by changing the temperature.



Melting process

- It is the change of matter from solid state to liquid state by heating.
- The particles move more and separate from each other.

Evaporation process

- It is the change of matter from liquid state to gaseous state by heating.
- The particles gain energy and move faster.

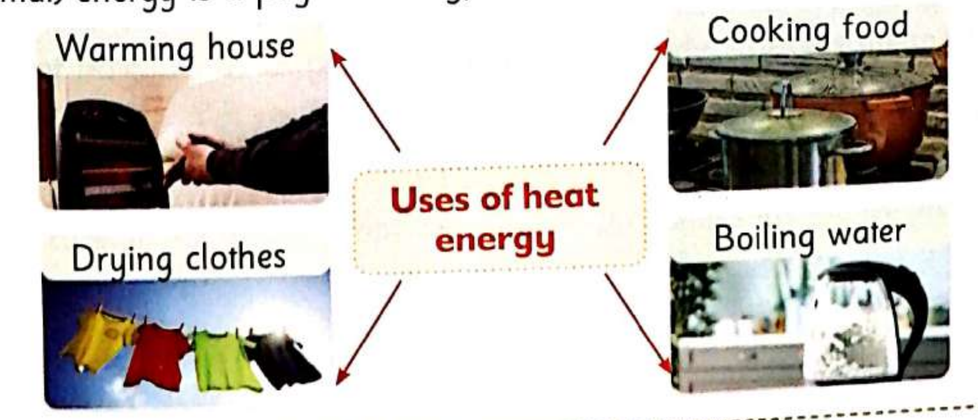
Condensation process

- It is the change of matter from gaseous state to liquid state by cooling.
- The particles of matter lose energy and move slowly.

Freezing process

- It is the change of matter from liquid state to solid state by cooling.
- The particles of matter lose energy and move slowly also they come closer to each other.

- Heat (thermal) energy is a physical thing, we use it every day.



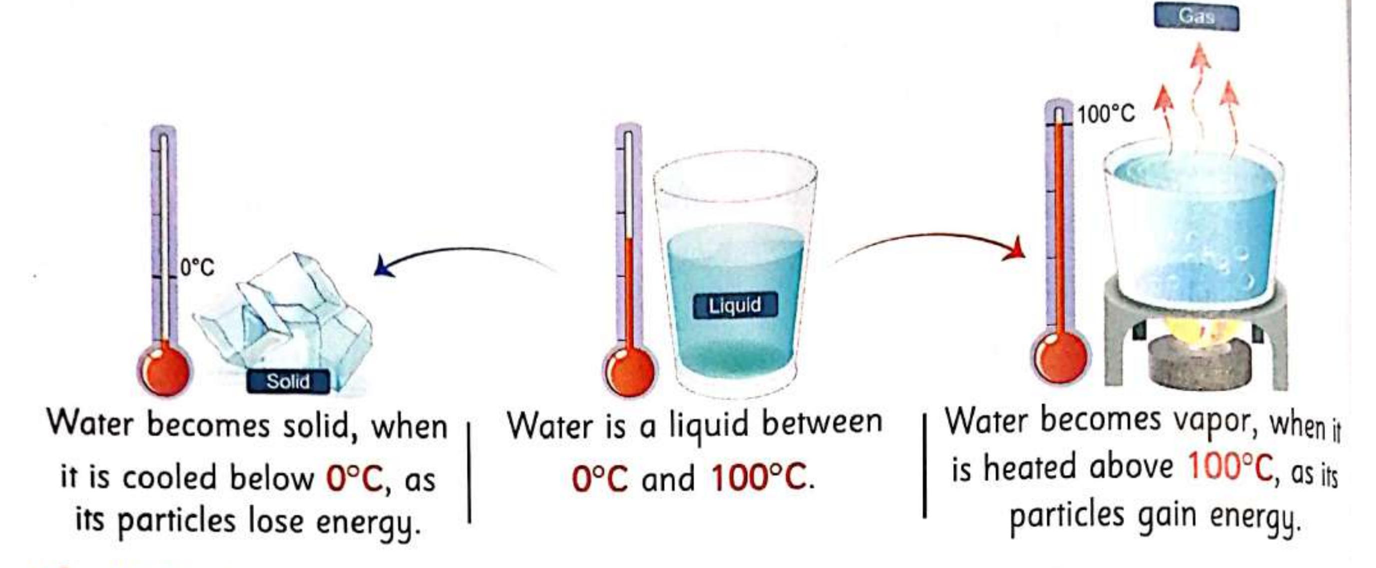
Parents' Tips

Help your child review and explain the main ideas of matter changes and make a lesson summary.





Water differs from other substances in that it can exist in all three states of matter at room (ordinary) temperature.



Water becomes solid, when it is cooled below 0°C, as its particles lose energy.

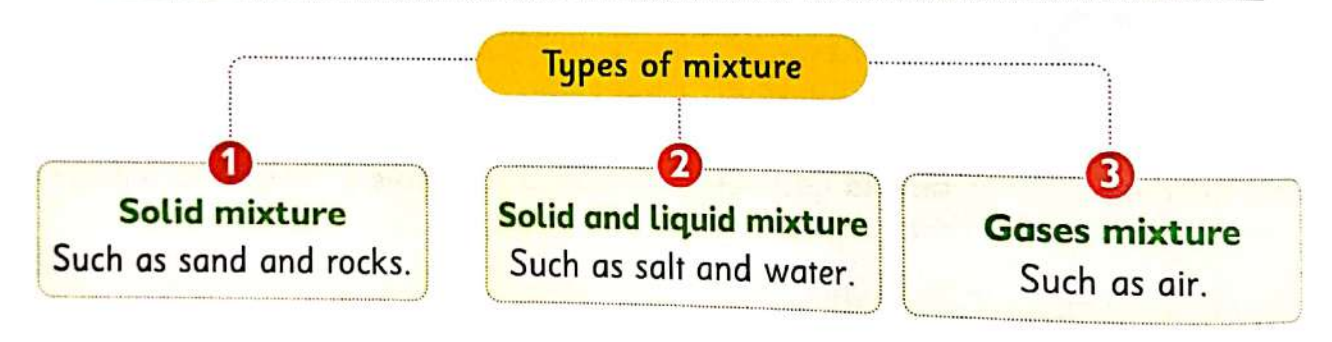
Water is a liquid between 0°C and 100°C.

Water becomes vapor, when it is heated above 100°C, as its particles gain energy.



Mixture

It is a form of matter made of two or more different components.



Properties of mixture:

1. The components of mixtures which are physically combined (don't react with each other).
2. Each component keeps its physical properties (identity) such as color, taste, and odor.
3. Mixtures components can be separated easily from each other.





Separating mixtures:

- There are different ways to separate the components of a mixture which are:

1. Using filter paper (filtration)
2. Evaporation Process
3. Using magnet

- There are some differences between the mixture and compound:

The mixture	The compound
▸ It is made of two or more components mixed together physically. ▸ Its components can be separated easily by a physical way.	▸ It is made of two or more components combined together chemically. ▸ Its components can be separated by a chemical way.
Ex. Salt water (which is produced by dissolving salt in water). 	Ex. Pure water (which is produced from the chemical combination between oxygen and hydrogen). 

The mass of the mixture is the sum of the masses of the substances that make the mixture.

- Matter can be changed by two ways, physical and chemical changes:

Physical change	Chemical change
▸ It is a change in the shape and the size of the matter only without forming a new substance.	▸ It is a change in the shape and the structure of matter producing a new substance with different properties.
▸ The matter may turn back to the original form so it is reversible change.	▸ The new substance can't return back to the original form so it is irreversible change.
▸ It doesn't change the matter properties.	▸ It changes the matter properties.
Ex. Dissolving of sugar in water	Ex. Burning of sugar




Remember Understand Apply Analyze

1 Choose the correct answer:

1. .... is the gaseous state of water.
   a. Ice b. Vapor c. Water d. Wax
2. The opposite figure represents the .... state of matter.
   a. solid b. liquid
   c. gas d. matter
3. The opposite figure represents the .... state of matter.
   a. solid b. liquid
   c. gas d. matter
4. Which surface melts a cube of ice faster?
   a. Stove. b. A surface exposed to the sun.
   c. A surface exposed to air conditioner. d. No correct answer.
5. The piece of wood is a solid matter as a result of ....
   a. its taste b. its fixed shape c. its odor d. its color
6. The particles number of matter are .... whatever their state.
   a. variable b. fixed c. different d. moving
7. During heating particles, they ....
   a. move around b. transfer to another matter
   c. stop moving d. No correct answer
8. The mass of a substance changes in case of ....
   a. changing the temperature of the matter
   b. changing the state of the matter
   c. mixing the matter with other substances that didn't react with one another
   d. changing the amount of matter in it
9. The spaces between the matter particles in the .... state are very big.
   a. solid b. liquid c. gaseous d. liquid and gaseous





10. When something melts, it changes from a .... to a ....
   a. gas - liquid b. liquid - gas c. solid - liquid d. liquid - solid
11. Solids can be ....
   a. evaporated b. melted c. poured d. moved
12. Hossam bought a chocolate bar, and he left it out of the fridge, subjected to the sunlight for a long time. Which of the following statements describes what happened to the chocolate bar?
   a. The chocolate structure had been changed and a new substance was formed.
   b. The chocolate melted but its structure still the same.
   c. The chocolate taste was changed as a chemical change had occurred.
   d. We smell the burning of chocolate.
13. Water molecules lose their energy and move slower when ....
   a. we leave ice in sunlight for a while b. we heat water on a flame
   c. we put a bottle of water in the fridge d. All the previous answers
14. By decreasing water temperature to 0°C, the molecules ....
   a. move closer to each other forming ice
   b. move closer to each other forming water vapor
   c. move away and water stays liquid d. move away forming water vapor
15. All the following are gases except ....
   a. oxygen b. water vapor
   c. carbon dioxide
   d. condensed water vapor on the leaves of trees
16. All the following are mixtures except ....
   a. cement b. milk c. flour d. soya sauce
17. How are mixtures and compounds different from each other?
   a. There are no differences.
   b. The mixture combines chemically and the compound combines physically.
   c. They have more than one substance in them.
   d. The mixture combines physically and the compound is not easily separated.
18. Combination of two or more substances that are not chemically combined is called ....
   a. a compound b. mixtures c. mass d. volume







19. All the following are from the properties of the mixture except ....
    a. its components can't be separated easily
    b. its components keep its own properties
    c. its components can be separated easily
    d. its components are mixed physically
20. All the following are chemical changes except ....
    a. adding yeast to dough in baking
    b. melting a piece of iron and reshaping it
    c. water - carbon dioxide reaction in photosynthesis in plants
    d. iron - oxygen reaction to form rust

2 Complete the following sentences using words between brackets:

1. Melting is the opposite of .... (freezing – evaporation)
2. When water vapor is cooled, it will be .... (frozen – condensed)
3. Particles of matter are in a .... state. (motion – static)
4. Seeing drops of water on glass windows is the result of .... (condensation – evaporation)
5. The boiling point of water is .... (0°C – 100°C)
6. Iron reacts with .... in the air and gets rusted. (oxygen – nitrogen)
7. Digestion is a .... change. (chemical – physical)
8. The components of mixtures can be .... easily. (separated – reacted)
9. Melting a piece of wax is a .... change, while burning wax is a .... change. (physical/chemical – chemical/physical)
10. The melting point of ice is .... (100°C – 0°C)
11. We can separate the mixture of .... by filtering. (water and salt – sand and water)

3 Put (✓) or (✗) in front of each sentence:

1. Melting of ice changes the structure of water. (   )
2. By increasing temperature, the particles of matter lose energy and become faster. (   )
3. The mass of the solid mixture is greater than the mass of the mixture components before mixing. (   )
4. During changing liquids into solids, the particles move away from each other. (   )



5. Temperature doesn't affect neither the state of matter nor the movement of its particles. ( )
6. Water is a liquid when the temperature is less than $0^{\circ}C$. ( )
7. It is very hard to separate salt from water in salty water mixture. ( )
8. Rusted iron and burning wood are examples of chemical changes. ( )
9. Tap water is a mixture, but seawater is a pure substance. ( )
10. The molten wax can return back again to its original shape. ( )
11. Appearance of strong odor is evidence of a physical change. ( )

4 Write the scientific term for each of the following:

1. The process in which the solid changes into liquid by heating. (..............................)
2. The process in which the liquid changes into gas by heating. (..............................)
3. The process in which the gas changes into liquid by cooling. (..............................)
4. The process in which the liquid changes into solid by cooling. (..............................)
5. It is a form of matter made of two or more different substances mixed together physically. (..............................)
6. It is a form of matter made of two or more different substances mixed together chemically. (..............................)
7. It is a type of mixtures that has solid components only. (..............................)
8. A mixture of invisible gases. (..............................)

5 Match from column (B) what suits in column (A):

(A)	(B)
1. The particles of .... move quickly and spread out.	a. physical
2. Reshaping of copper into wires is a .... change.	b. tomato sauce
3. Matter consists of small bodies called	c. chemical
4. The components of the mixture of .... cannot be separated easily.	d. particles
	e. water vapor

1. .... 2. .... 3. .... 4. ....



6 Answer the following questions:

1. What does this figure represent?
   a. Compound b. Mixture c. Matter
2. Write examples of each of the following:
   a. Solid-liquid mixture. (..............................)
   b. Liquid mixture. (..............................)
   c. Reversible change. (..............................)
   d. Irreversible change. (..............................)
3. Which is the best way used for separating the following:
   a. Iron filings from sand. (..............................)
   b. Chalk powder from water. (..............................)
   c. Salt from salt water. (..............................)
4. Classify the following into chemical and physical changes:
   a. Making a golden ring from a piece of gold. (..............................)
   b. An orange fermentation. (..............................)
   c. Making a cake. (..............................)
   d. Making a chair from wood. (..............................)
   e. Cutting a piece of paper into small pieces. (..............................)
   f. Burning a piece of paper. (..............................)
   g. Dissolving salt in water. (..............................)
   h. Putting a bottle of water in the freezer. (..............................)
   i. Making an iron nail from a piece of iron. (..............................)
5. How do you know that matter has changed?
   a. The matter stays the same.
   b. New material is formed.
   c. The matter gets more mass.
   d. The matter gets less mass.
6. If the mass of butter before melting = 500 grams, the mass of the butter after melting = ... grams.

500.0g

Before melting

0

After melting



1 Choose the correct answer:

1. The following indicates that a chemical change has been occurred except ....
   a. formation of bubbles
   b. changing of shape only
   c. forming new substances
   d. producing light or heat
2. Which case represents the matter particles gaining the most energy more quickly?
   a. Putting a bottle of water in the fridge.
   b. Heating a pot with a piece of butter.
   c. Exposing a cold glass surface to water vapor.
   d. Putting a piece of butter out of the fridge.
3. A change in the temperature of a substance leads to ....
   a. change in mass of matter
   b. change of physical state of matter
   c. change in the number of particles of matter
   d. All the previous answers
4. The following physical changes can occur in metals except ....
   a. painting metal to save it from rust
   b. forming rust on metal surfaces
   c. reshaping metals
   d. making wires from metal

2 Complete the following sentences using words between brackets:

1. .... is two or more substances, each of which retains its properties. (Compound – Mixture)
2. The components of .... can be separated easily using magnet. (sand and rocks – sand and iron nails)
3. When the temperature of the substance increases, the particles will .... (converge – diverge)
4. Ice water and liquid water have the same .... (structure – shape)

3 Put (✓) or (✗) in front of each sentence:

1. If the sum of masses of different substances equals 30 gm, then the mass of their mixture is more than 30 gm. (   )
2. If you keep the milk out of fridge, a chemical change would occur. (   )
3. Solids and liquids both have a definite shape. (   )
4. The particles of gases spread out and move quickly and randomly. (   )

4 Complete the following diagram:

Solid → 1. .... process, By 2. .... → Liquid → 3. .... process, By 4. .... → Gas

Slippery Sands

Before inventing cranes or other heavy machinery to lift and move heavy objects.

"How did ancient Egyptians were able to move very heavy, large blocks of stones across the desert sands?"

- On the hieroglyphics and paintings of ancient Egyptians, a person was pouring a liquid from a jar in front of the sled.
- Historians believed that this was related to a holy cleansing ceremony.
- Scientists had another theory that: maybe, they were adding water to the sand to make the sand more slippery, so they could move the heavy large blocks more easily (when an object rubs over the other there is friction, which helps in resisting its movement).



Properties of Sand:

- Sand particles are rough with strong angles and edges.
- So, when water is added to sand, it connects the particles to one another.

Let us use what we have learned about the properties of materials to help us investigate "How adding water to sand makes it more slippery" ...

Hypothesis:

- Adding water to sand will make it more slippery and easier to move the wooden block (or brick).

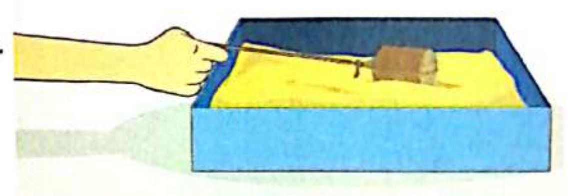
Materials:

- Each group of students should have:
  - Tray.
  - Sample of Sand (not wet).
  - Balance (to measure the sand).
  - String (or rope).
  - Heavy Wood block or Brick.
  - Water.
  - Graduated cylinder or Measuring cup (to measure the amount of water added).



Steps:

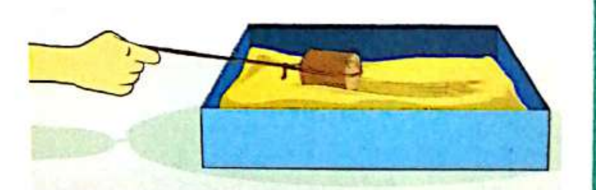
- Balance an amount of sand and put it in the tray.



- Tie a string (or rope) around the wooden block.

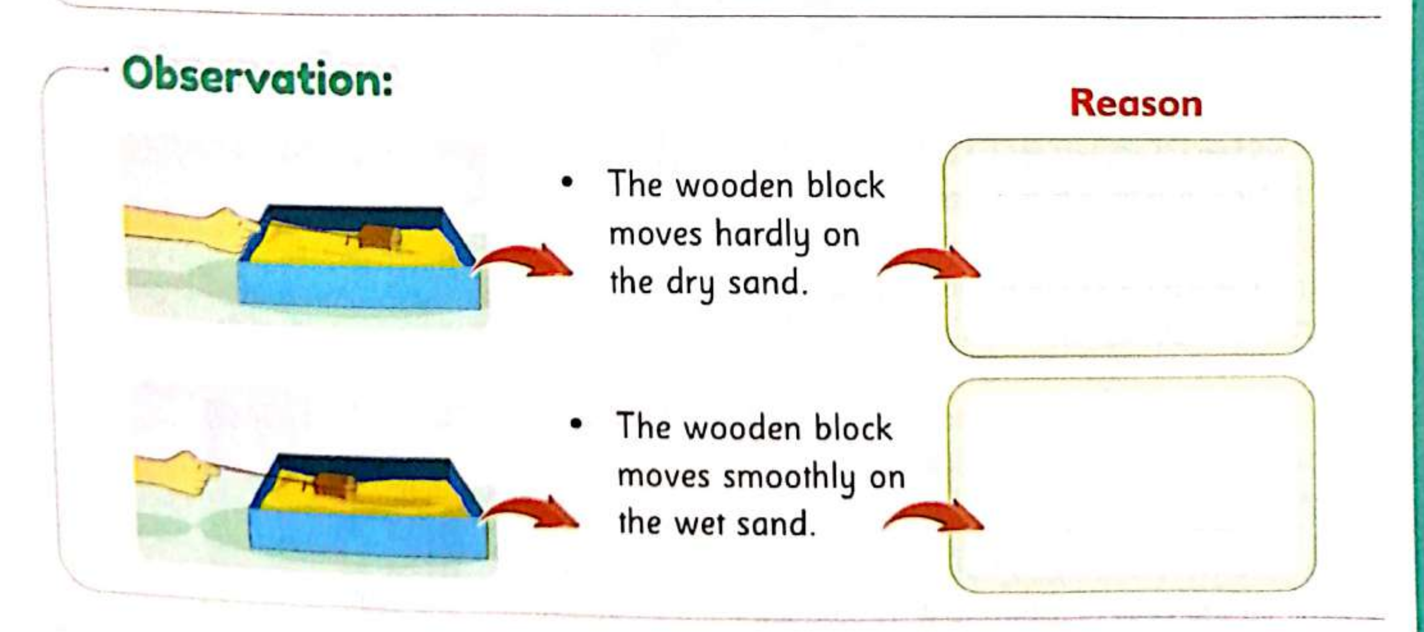


- Place a wooden block on the sand and start pulling it over the sand and record your observation.
- Add 100 ml of water to the sand.



- Try to pull the block over the sand again and record your observation.

Observation:





Lab Safety Protocols



Dress for Safety

Safety Goggles

Wear safety goggles to protect your eyes when handling chemicals, liquids, or organisms.

Lap Coat

Wear a lab coat (or apron) over your clothes. Wear proper clothing and clothing protection. Tie back long hair, roll up long sleeves if they are available.

Gloves

Use gloves to protect your hands.

Long Sleeves

During field investigations, wear long pants and long sleeves.

Long Pants

Closed Shoes

Always wear close-toed shoes.

Be Prepared for Accidents!!

Safety First

Know the location of safety equipment and emergency numbers.

- Even if you are practicing safe behavior during an investigation, accidents can happen.
- Once an accident occurs, immediately alert your teacher and classmates. Do not keep the accident a secret or respond to it by yourself.



Practice Safe Behavior

There are many ways to stay safe during a scientific investigation. You should always use safe and appropriate behavior before, during, and after your investigation.

Steps of Procedures

Read and understand all the steps of the procedure. Ask your teacher for help if you do not understand any part of the procedure.



ID Hazards

Label any chemicals you are using. Always read labels before using any chemicals. Gather all your materials and keep your workstation neat and organized.

Be Attentive

Be attentive while in the lab. Don't leave an experiment in progress.



No Food

Don't eat or drink in the lab and never taste chemicals.

Respect Nature

Treat animals and plants with respect during an investigation.



Proper Supervision

Don't perform lab experiments without instructor's supervision. If asked to observe the odor of a substance, cup your hand over the container holding the substance and gently wave air toward your face to be able to smell.

Handle Glassware Carefully

Properly dispose of anything that breaks.

Make sure that you have returned any extra materials and disposal of anything that breaks to the correct storage space.



Clean up

After completing the lab experiments, carefully clean your workspace and the equipment. Don't forget to wash your hands.

Unit 1



Concept 1 Plant Needs

Answer Guide: P. 71

Assessment 1

(Total mark) 20

1 Choose the correct answer:

1. Which statement is not an accurate representation of plant activity?
   a. Photosynthesis occurs in tiny structures called chloroplasts.
   b. Sugars are moved to the leaves from the roots through the stem.
   c. Roots carry water and nutrients from the soil to the rest of the plant.
   d. Plants use sunlight, nutrients from the soil, water, and air to make the food they need.
2. .... allow(s) carbon dioxide to enter the leaves.
   a. Stomata
   b. Chloroplasts
   c. Chlorophyll
   d. Roots
3. Potato and sweet potatoes can grow underground, so they are ....
   a. tuber stems
   b. climbing stems
   c. runners
   d. shrubs
4. A .... is actually a miniature plant waiting to grow.
   a. seed
   b. leaf
   c. rock
   d. flower
5. Wing-shaped seeds can disperse by .... easily.
   a. air
   b. sunlight
   c. water
   d. animals

2 Complete the following sentences using words between brackets:

1. .... absorbs light energy to help the plant make its food. (Chloroplast – Root)
2. Xylem helps the plant transport water and minerals from the roots .... (upwards – in all directions)
3. .... carry blood rich in oxygen. (Arteries – Veins)
4. Plants absorb .... from the air to make their own food. (oxygen – carbon dioxide)
5. Arteries carry blood from the heart and the .... to all the body parts. (lungs – brain)

3 **(A) Put (✓) or (✗) in front of each sentence:**

1. The plant grows well and healthy with green leaves in the absence of light. ( )
2. The blood flows in all directions within the blood vessels. ( )
3. Plants and animals can make their own food by themselves. ( )

(B) Write the scientific term for each of the following:

1. The process by which plants make glucose that helps them grow and thrive.

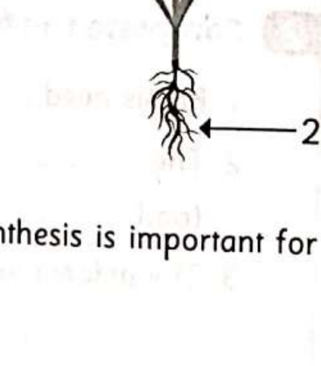
(....................................)

2. The system that transports water, minerals, and sugars throughout the plant body.

(....................................)

4 **Answer the following questions:**

1. **Look at the plant, then answer:**

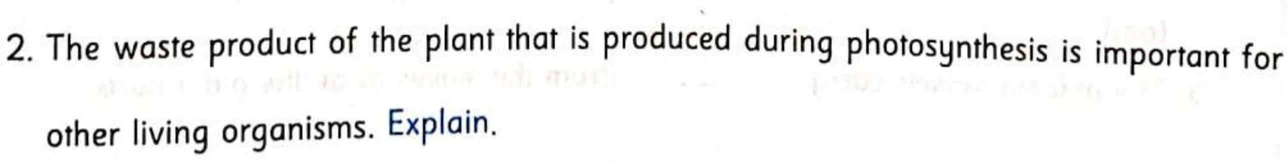


a. The function of number (1) is

....

b. The function of number (2) is

....



2. The waste product of the plant that is produced during photosynthesis is important for other living organisms. Explain.

....

Assessment (2)

(Total mark) 20

Answer Guide: P. 71

1 Choose the correct answer:

1. During photosynthesis, plants can convert .... energy to .... energy.
   a. light, chemical
   b. chemical, light
   c. light, thermal
   d. chemical, thermal
2. Roots absorb .... and .... from the soil.
   a. minerals
   b. carbon dioxide
   c. water
   d. Both (a) and (c)
3. The plant can reproduce and survive by having ....
   a. flowers
   b. seeds
   c. air
   d. Both (a) and (b)
4. All the following are among the products of photosynthesis that are used by the plants to grow except ....
   a. sugars
   b. fats
   c. proteins
   d. oxygen
5. The .... pump(s) blood throughout the body through a closed system of tubes.
   a. arteries
   b. heart
   c. veins
   d. phloem

2 Complete the following sentences using words between brackets:

1. Plants need .... to grow. (shelter – sunlight)
2. The .... helps to support the plant. It holds the leaves up to get sunlight to make food. (stem – flower)
3. The phloem vessels carry .... from the leaves to all the plant parts. (water – sugars)
4. .... allow(s) air to move in and out the leaves. (Stomata – Phloem)
5. A seed that is light and has wing-shaped structure can be dispersed easily by .... (air – water)

3 (A) Put (✓) or (X) in front of each sentence:

1. Plants make their own food and use the energy which they have got from the food to grow. (   )
2. Seeds can germinate without soil. (   )
3. Both plants and humans need gases to survive. (   )

(B) Write the scientific term for each of the following:

1. A blood vessel that carries blood rich in carbon dioxide and low in oxygen. (..............................)
2. A plant part that anchors it in the soil. (..............................)

4 Answer the following questions:

1. This figure represents the .... system.
   a. Arteries transport blood from the .... to ....
   b. Veins transport blood from .... to the ....
2. Plant roots have small structures called "root hairs." What is their function?
   ....
3. Plant leaves have green color. Why?
   ....



Concept 2 Energy Flow in Ecosystems

Answer Guide: P. 71

Assessment 1

(Total mark) 20

1 Choose the correct answer:

1. .... are the organisms that are able to produce their own food.

   a. Consumers   b. Decomposers   c. Producers   d. No correct answer.

2. Fungi and Bacteria are called ....

   a. consumers   b. decomposers   c. producers   d. scavengers

3. All the following are types of ecosystem except ....

   a. ocean   b. sun   c. rainforest   d. tundra

4. The eagle in a food chain is a predator, as it obtains its energy by ....

   a. eating decomposers   b. eating consumers
   c. making its own food   d. eating producers

5. Which of the following is the proper order of a short food chain?

   a. Producers ⟶ Decomposers.
   b. Consumers ⟶ Producers ⟶ Consumers.
   c. Producers ⟶ Consumers ⟶ Decomposers.
   d. Consumers ⟶ Producers ⟶ Decomposers.

2 Put (✓) or (✗) in front of each sentence:

1. The consumer eaten by another animal is called a predator. (   )
2. In the presence of decomposers, the Earth would be full of dead bodies. (   )
3. Energy in the form of food flows from the producers to the consumers. (   )
4. All living things are a part of the food chain. (   )
5. Long food chains consist of only one consumer. (   )

3 Write the scientific term for each of the following:

1. They are the organisms that cannot produce their own food, but they must eat other living things to get energy. (..............................)
2. They are the nature's recycling factories. (..............................)
3. The model that shows many different feeding relationships among living things. (..............................)
4. They are the animals that eat dead animals. (..............................)
5. They are the organisms that are able to produce their own food. (..............................)

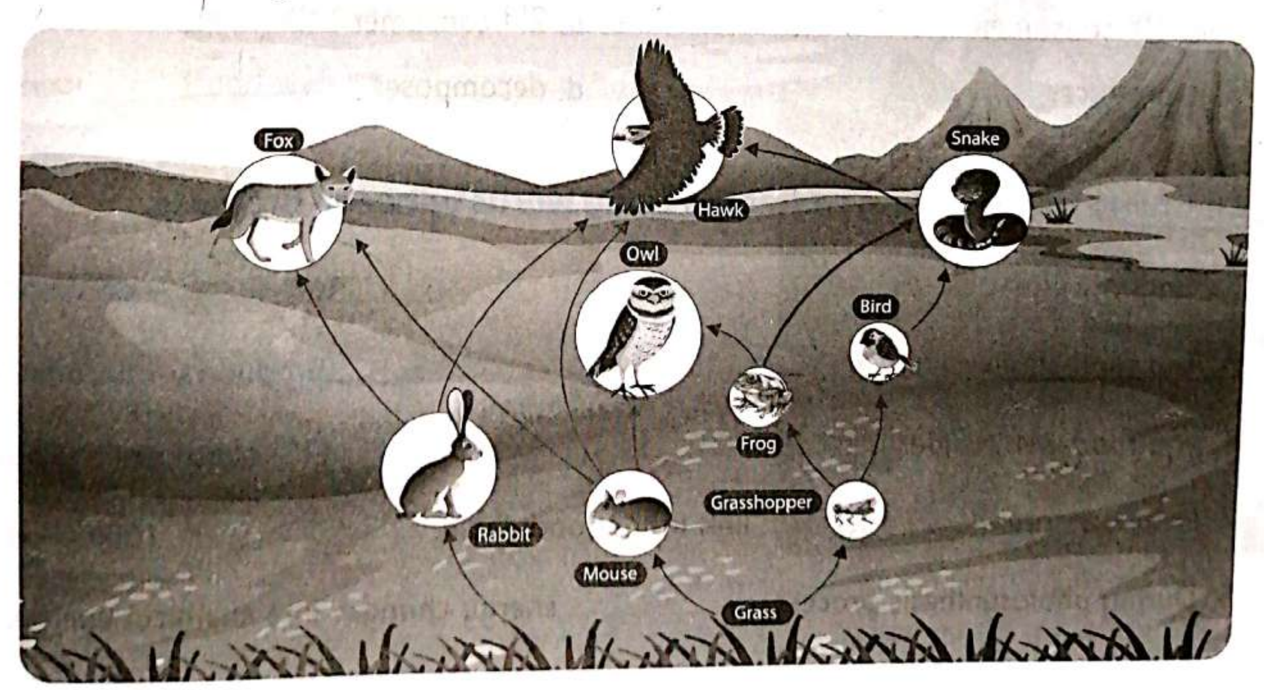
4 Look at the following figure, then answer:

(A) This figure represents a ....

(food web - food chain)

(B) Classify the following:

1. The producer(s) is/are the ....
2. The first consumer(s) is/are the ....
3. The second consumer(s) is/are the ....
4. The tertiary consumer(s) is/are the ....



Assessment (2)

(Total mark) 20

Answer Guide: P. 71

1 Choose the correct answer:

1. .... is/are the source(s) of radiant energy to the plants.
   a. Producers b. Sunlight c. Decomposers d. No correct answer.
2. All .... need a source of energy.
   a. minerals b. oceans c. organisms d. mountains
3. When the decomposers disappear from a habitat ....
   a. they produce their own food using radiant energy
   b. they move to another ecosystem
   c. they recycle the environment of the ecosystem
   d. the dead bodies will cover this habitat
4. All the following are scavengers except ....
   a. vultures b. hyenas
   c. bacteria d. houseflies
5. A banana tree is a ....
   a. 1^{ry} consumer b. 2^{ry} consumer
   c. producer d. decomposer

2 Complete the following sentences using words between brackets:

1. Fungi are classified as .... (producers – decomposers)
2. Any food chain ends with .... (producers – decomposers)
3. In a food web, spider is a .... (1^{ry} consumer – producer)
4. Producers are the .... link in the food chain. (first – second)
5. During photosynthesis process, ... energy changes into chemical energy. (electric – radiant)

3 Match from column (B) what suits in column (A):

(A)	(B)
1. It is the final link in a food chain.	a. Prey
2. The community of living and non-living things is called the	b. Decomposers
3. .... are the animals that eat primary consumers.	c. Primary consumer
4. If a grasshopper eats the plant, then the grasshopper is a	d. Secondary consumer
5. In a food relationship between a fox and a rabbit, the rabbit is the	e. Ecosystem

1. .... 2. .... 3. .... 4. .... 5. ....

4 Look at the opposite figure, then answer:



(A) This figure represents a ....

(food web - food chain)

(B) Classify the following:

1. The eagle is a ....
2. The bird is a ....
3. The snail is a ....
4. The sunflower is a ....



Concept 3 Changes in Food Webs

Answer Guide: P. 72

Assessment 1

(Total mark)  20

1 Choose the correct answer:

1. Interdependence between living organisms means ....
   a. two living organisms or more depend on each other to get their food
   b. one organism kills another organism
   c. there is no relation between living organisms
   d. No correct answer.
2. The consumers in a food web move to another place due to ....
   a. disappearing of producers
   b. disappearing of food resources
   c. changes in the environment
   d. All the previous answers.
3. What do arrows in the food web represent?
   a. They point to the organism that is being eaten.
   b. They show how sunlight flows within an ecosystem.
   c. They show what direction the energy is flowing between organisms.
   d. They represent how water is transferred within a habitat.
4. A marine protected area is ....
   a. an area of the sea where we dump rubbish
   b. an area of the sea which is protected from human activities like fishing
   c. an area of the sea where there are no laws
   d. No correct answer.
5. Which of the following human activities causes the greatest destruction to the environment?
   a. Replanting trees.
   b. Recycling cardboard boxes.
   c. Burning fossil fuels.
   d. Using solar energy.

2 Put (✓) or (✗) in front of each sentence:

1. Among the land activities that affects the marine environment is the cultivation of land. ( )
2. The small amount of rain in desert affects its food webs. ( )
3. Decomposers help break down dead animals and plants into nutrients that can be returned to the ecosystem. ( )
4. In food webs, the energy transfers from large sized animals to small sized animals. ( )
5. The cold water destroys coral reefs. ( )

3 Complete the following sentences using words between brackets:

1. The heavy rains .... the desert ecosystem. (improve – destroy)
2. The real food of sea turtles is the .... (plastic – jellyfish)
3. After the death of animals, the whole amount of energy returns to the .... (herbivore – ecosystem)
4. A .... is an illustration that shows how animals are connected in their search for food within an ecosystem. (food chain – food web)
5. In desert food web, the snake is eaten by a/an .... (eagle – hare)

4 Answer the following questions:

1. **Look at the opposite food web, then answer:**

   a. Which two animals compete for the same food?

   Lion and gazelle.

   Gazelle and zebra.

   b. What would happen if the number of lions in the ecosystem decreased?

   The number of zebra and gazelle would increase.

   The number of zebra and gazelle would decrease.

2. **Mention the reason why there is very little prey in the desert.**

....

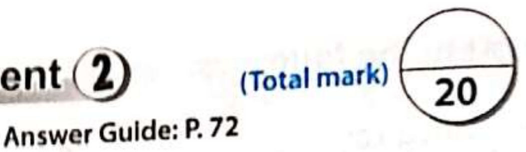
3. **Which sentence describes the factors that harm organisms in the food web?**

   a. Increasing the number of top predators in the food web.

   b. Decreasing the number of top predators in the food web.

   c. Drought in the soil.

   d. Plenty of plants.



Assessment (2)

(Total mark) 20

Answer Guide: P. 72

1 Choose the correct answer:

1. All the following are from the negative impacts of pollution on the food web except:
   a. Contaminating the resources that plants and animals consume.
   b. Organisms contact with toxins through direct or indirect exposure.
   c. The recycling of energy through the ecosystem.
   d. The disappearance of some organisms.
2. Recently, a family of snakes has moved into an area with a large mouse population. What changes may occur in the ecosystem?
   a. The mouse population may increase. b. The mouse population may decrease.
   c. The mouse population may increase first, then decrease.
   d. The mouse population will remain the same.
3. Which of the following is among the impacts that climate change may have on the environment?
   a. The overpopulation of living organisms which imbalances the ecosystem.
   b. Drought which decreases the number of living organisms.
   c. Extreme weather such as storms and wildfires.
   d. Both (b) and (c).
4. What does a food chain represent?
   a. How producers use sunlight to make food.
   b. Where resources are found in a habitat.
   c. How living organisms depend on each other to get their food.
   d. The broken down plants and animals remains.
5. Why is plastic dangerous for marine organisms?
   a. They mistake it for food and cannot digest it.
   b. It hinders their ability to swim.
   c. They use plastic waste for habitats.
   d. All the previous answers.

2 Complete the following sentences using the given words:

(die – human – move – on the surface – marine animals – habitat loss – destroys)

1. The organisms would either .... or .... to another place when the climate change is unsuitable.
2. Coral reefs are important for .... and ....

3. Overfishing causes ....
4. In oceans food web micro-organisms live .... of the ocean.
5. In desert food web, the absence of grass .... the ecosystem.

3 Put (✓) or (✗) in front of each sentence:

1. Warmer ocean temperatures may lead to the death of algae and coral bleaching. (   )
2. Pollution affects the consumers only in the food web. (   )
3. In the food web, the energy transfers from primary consumers to producers. (   )
4. Loss of habitat causes loss of shelter for animals and humans. (   )
5. Coral reefs increase the national income from tourism. (   )

4 (A) Write the scientific term for each of the following:

1. It is the number of organisms of one type of species living in an area. (..................)
2. They are any increase or decrease in the number of the organisms in an area. (..................)
3. The process by which natural habitat becomes incapable of supporting its native species. (..................)

(B) Answer the following questions:

1. Does pollution of the marine environment affect humans?

   Yes ☐   No ☐

2. Pollution and climate change harm coral reefs as their colors change into (blue – white), then they lose their beautiful appearance and people can't travel to places of coral reefs for (diving – cycling).

Unit 2

Concept 1 Matter in the World Around Us

Answer Guide: P. 72

Assessment 1

(Total mark) 20

1 Choose the correct answer:

1. A material (matter) changes from solid to liquid state by ....
   a. heating
   b. cooling
   c. decreasing the temperature
   d. No correct answer.
2. When you squeeze a balloon, its volume decreases due to ....
   a. increasing in particles mass
   b. decreasing in particles mass
   c. its expansion
   d. pushing particles toward each other
3. .... state(s) can't be poured.
   a. Liquid and solid
   b. Liquid and gas
   c. Solid only
   d. Liquid only
4. Which of the following has a definite shape and volume?
   a. Solid.
   b. Liquid.
   c. Gas.
   d. All the previous answers.
5. The particles that build up water vapor are ....
   a. tightly packed
   b. moving freely
   c. close together
   d. No correct answer.

2 Complete the following sentences using words between brackets:

1. .... is a tool used to measure lengths. (Scale – Meterstick)
2. Particles in .... spread out freely. (liquids – gases)
3. .... is an unreal model of the Earth that shows its main features. (Globe – Model)
4. A ball is filled with .... (water – air)
5. Particles of matter .... be seen with the naked eye. (can't – can)

3 Match from column (B) with what suits in column (A):

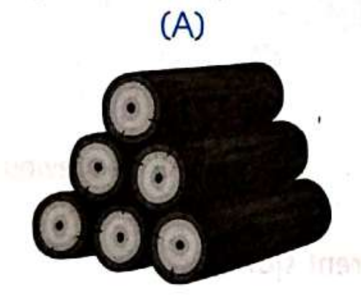
(A)	(B)
1. Particles	a. help us see small objects.
2. Matter	b. unless an action is done to change them.
3. Magnifying lens	c. are extremely tiny.
4. Particles of gaseous materials	d. is anything that has mass and takes up space.
5. Solids keep their shapes	e. are not held close together.

1. .... 2. .... 3. .... 4. .... 5. ....

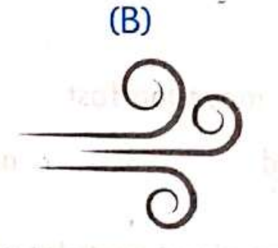
4 Look at the following figures, then answer:

(A) Classify the following figures into "Solid, Liquid and Gas":

(A)



(B)



(C)



1. (A) is a .... 2. (B) is a .... 3. (C) is a ....

(B) Write the suitable state of matter beside each of the following sentences:

1. The state which takes up definite space and has a definite shape and different textures. (....................)
2. The state which takes up space all around us, has an indefinite shape, and is invisible. (....................)

Assessment (2)

(Total mark) 20

Answer Guide: P. 72

1 Choose the correct answer:

1. We can measure temperature using a ....
   a. meterstick b. thermometer
   c. scale d. All the previous answers.

2. How are solids unique from other forms of matter?
   a. They take the shape of the container. b. They can fill any container.
   c. They can't be poured. d. They have a definite shape and volume.

3. Which of the following illustrates the particles of the liquid state?
   a. b.
   c. d. No correct answer.

4. The particles of .... move too fast.
   a. water b. wood c. air d. All the previous answers.

5. Which of the following is true about particles of different states?
   a. They move alike. b. They can be seen.
   c. They move freely. d. They take up space.

2 Put (✓) or (X) in front of each sentence:

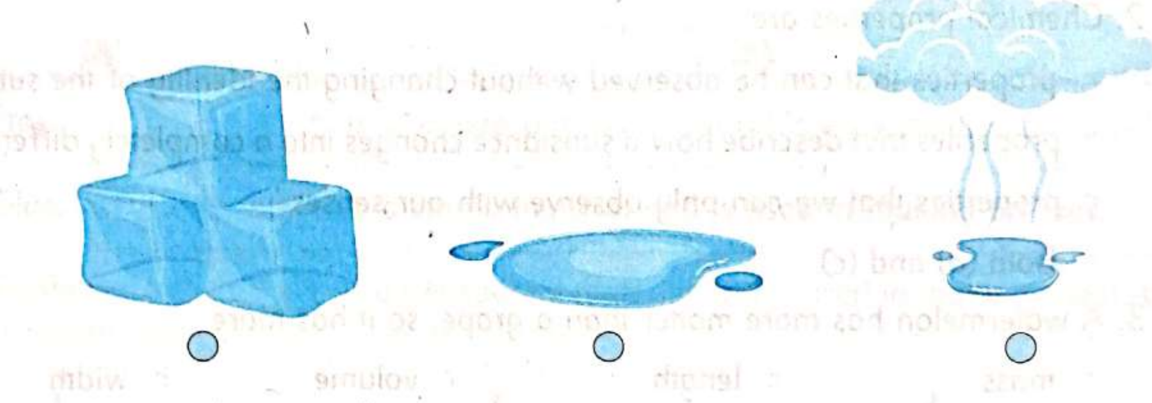
1. We fill our lungs with air during exhalation process. (   )
2. Liquids and gases can be poured. (   )
3. Matter can change from one state to another. (   )
4. A blood cell is made up of one particle. (   )
5. The speed of the particles movement in the three states of matter is alike. (   )

3 Write the scientific term for each of the following:

1. They are the building blocks of matter. (..............................)
2. A state of matter that has tightly packed particles. (..............................)
3. It is a copy that is similar to the real thing. (..............................)
4. Anything that has mass and takes up space. (..............................)
5. A state of matter whose particles slide past each other. (..............................)

4 Look at the following figures, then answer:

(A) Match each object to how its particles look like:







(B) Circle the correct answer:

1. Solid particles (move freely – vibrate).
2. Liquid particles (keep their shape - take the shape of the container).



Concept 2 Describing and Measuring Matter

Answer Guide: P. 73

Assessment 1

(Total mark) 20

1 Choose the correct answer:

1. Physical properties are the ....
   a. properties that can be observed without changing the identity of the substance
   b. properties that describe how a substance changes into a completely different substance
   c. properties that we can observe with our senses
   d. Both (a) and (c)
2. Chemical properties are ....
   a. properties that can be observed without changing the identity of the substance
   b. properties that describe how a substance changes into a completely different substance
   c. properties that we can only observe with our senses
   d. Both (a) and (c)
3. A watermelon has more matter than a grape, so it has more ....
   a. mass b. length c. volume b. width
4. If a 50 g piece of wood is divided into equal halves, the density ....
   a. will be less b. will be the same c. will be more d. is doubled
5. Helium is used in filling birthday balloons, as............ .
   a. it has more density than air b. it is poisonous
   c. it has less density than air d. Both (a) and (b)

2 Complete the following sentences using words between brackets:

1. To measure the volume of a liquid in a recipe, we use .... (measuring cup – ruler)
2. .... is not attracted to the magnet. (Glass – Steel)
3. Objects that sink in water, their molecules are more .... than the molecules of water. (tightly packed – spread out)
4. The density of 10 g of iron is .... the density of 20 g of iron. (more than – equal to)
5. Your mass is measured by .... (balance – kilogram)





3 (A) Put (✓) or (✗) in front of each sentence:

1. Gases have no volume and mass. ( )
2. 1000 grams equal 1 kilogram. ( )
3. Flammability of matter is a chemical property. ( )

(B) Write the scientific term for each of the following:

1. The space that is taken by objects. (..............................)
2. The measuring unit that is equal to the mass of one paperclip. (..............................)

4 (A) Match from column (A) with what suits in column (B):

(A)	(B)
1. Steel	a. is a waterproof material and is used in making gloves.
2. Glass	b. is a strong material and is used in making bridges.
3. Rubber	c. is a transparent material and is used in making eyeglasses.

1. .... 2. .... 3. ....

(B) Answer the following questions:

1. Copper is used in making cooking pan, while wood is used in making their handles.

Explain.

....

2. Ice floats over water although they are the same matter.

Explain regarding the density.

....

Assessment (2)



Answer Guide: P. 73

1 Choose the correct answer:

1. All the following are from the physical properties of matter except ....
   a. conductivity b. magnetism c. color d. rusting
2. Burning a piece of paper is a .... property.
   a. physical b. chemical c. mathematical d. technical
3. All the following are from the measuring units of volume except ....
   a. milliliter b. liter c. kilogram d. cubic centimeter
4. Copper is used in making electric wires because ....
   a. it is easily to be shaped
   b. it is a good conductor of electricity
   c. it is a good conductor of heat
   d. Both (a) and (b)
5. If there are two different substances that look exactly the same, which properties will be used to differentiate between them?
   a. Color. b. Size. c. Density. d. No correct answer.

2 Complete the following sentences using words between brackets:

1. 8 kilograms equal .... grams. (8000 – 800)
2. When an iron nail rusts, this indicates one of the .... properties of iron. (chemical – physical)
3. .... is used in making eyeglasses. (Glass – Wood)
4. Oil has a lower density than water, so it has .... tightly packed molecules than water. (more – less)
5. Rubber is used in making gloves and the bottoms of sneakers because it is .... (flexible – hard)

3 (A) Put (✓) or (X) in front of each sentence:

1. 1 L equals 1000 cm^3. ( )
2. Iron sinks in water because it has more density than it. ( )
3. We can differentiate between aluminum and steel using a magnet. ( )

(B) Write the scientific term for each of the following:

1. The amount of matter in an object. (.................................)
2. A tool that is used in measuring temperature. (.................................)

4 Answer the following questions:

1. A scientist is comparing three common materials. He/She has a sample of each material that is exactly 10 cm^3 (cc = Cubic centimeter).

Using what you know about matter, fill in the table with the properties of each material.

smooth | rough | brown | gray
silver | 26 g | 6 g | 10 g

Material	Texture	Color	Mass of 10 cc sample
Cardboard	....	....	....
Large Coin	....	....	....
Granite Rock	....	....	....

2. Steel has many uses in our daily lives. **List two uses.**

....

Concept 3 Comparing Changes in Matter

Answer Guide: P. 73

Assessment 1

(Total mark) 20

1 **Choose the correct answer:**

1. Spaces between molecules are the largest in the .... state.
   a. solid   b. liquid   c. gaseous   d. liquid and gaseous
2. Any change in matter temperature causes ....
   a. changing its mass   b. changing its state
   c. changing the number of its particles   d. All the previous answers
3. The force between the solid particles is .... which makes them closely packed.
   a. very strong   b. very week   c. loose   d. No correct answer.
4. Which of the following does not melt?
   a. Ice.   b. Pencil.   c. Ice cream.   d. Chocolate.
5. All the following change the matter physically except ....
   a. folding   b. melting   c. cutting   d. burning

2 **(A) Put (✓) or (✗) in front of each sentence:**

1. The mass of a piece of butter equals the mass of the same piece after melting. (   )
2. There is an inverse relationship between temperature and the speed of particles. (   )

(B) Match from column (A) with what suits in column (B):

(A)	(B)
1. Changing ice into water by heating.	a. Condensation.
2. Changing water into ice by cooling.	b. they lose energy.
3. Changing water into vapor by heating.	c. Freezing.
4. Changing vapor into water by cooling.	d. Evaporation.
5. When matter particles are heated.	e. they gain energy.
6. When matter particles are cooled.	f. Melting.

1. .... 2. .... 3. .... 4. .... 5. .... 6. ....



3 Complete the following sentences using the given words:

(state - slower - constant - come closer - chemical - shape - physical - spread out)

1. Changing temperature affects the .... and .... of matter.
2. Melting of a cube of ice exposed to the sun is .... than melting of a piece of butter on a stove.
3. Particles of matter after changing from one state to another are .... in number.
4. If a substance is warmed up, its particles will ...., but if the matter is cooled down, its particles will ....
5. When the state of matter changes, this is called a .... change.

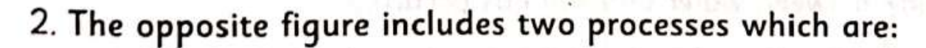
4 Answer the following questions:

1. **Look at the opposite figure that shows a mother putting the pasta and water in the tin.**



a. .... passes through the tin holes because it is in a .... state which (takes - doesn't take) the shape of the container.

b. .... doesn't pass through the tin holes because it is in a .... state which (takes - doesn't take) the shape of the container.



2. **The opposite figure includes two processes which are:**



a. boiling and freezing.
b. boiling and melting.
c. boiling and evaporation.
d. melting and freezing.

Assessment 2

(Total mark) 20

Answer Guide: P. 73

1 Choose the correct answer:

1. The opposite fruit salad is called a mixture because ....
   a. it is made of different components
   b. it is made of one type only of fruit
   c. we can separate banana from strawberry
   d. Both (a) and (c)

2. When salt water mixture is exposed to warm surface, ...
   a. water and salt evaporate
   b. water evaporates and the liquid salt is left behind
   c. salt evaporates and the liquid water is left behind
   d. water evaporates and the solid salt is left behind

3. Which statement describes a physical change? ....
   a. A substance is changed and a new substance with new properties is formed
   b. A substance cannot return to its original state
   c. The shape and the state of a substance is changed but its components remain the same
   d. The arrangement and the number of molecules are changed

4. Mineral water is .... because it contains useful minerals and salts.
   a. a liquid mixture, its components can be easily seen
   b. a gas mixture, its components cannot be seen
   c. not a mixture
   d. a liquid mixture, its components cannot be seen

5. Separating salt from seawater indicates that ....
   a. a chemical reaction between water and salt has occurred
   b. a chemical reaction between water and salt has not occurred
   c. a physical change has occurred when salt is mixed with water
   d. Both (b) and (C)

2 (A) Complete the following sentences using the given words:

(chemical – mixture – soluble – residue – physical)

1. Salt is a .... material which dissolves in water to form a ....
2. Solid particles which are left on the filter paper during filtration is called ....
3. Rotting of fruit is a .... change.

(B) Write the scientific term for each of the following:

1. It is made of two or more substances that are not chemically combined. (..........................)
2. It is made of two or more substances that are chemically combined. (..........................)

3 Put (✓) or (✗) in front of each sentence:

1. We can separate salt from water using filter paper. (   )
2. An unexpected change in color is a sign of a physical change. (   )
3. Producing a bubble is evidence that a chemical change has occurred.. (   )
4. When food is broken into small pieces by your teeth this is an example of the chemical changes inside your body. (   )
5. Milk is an example of a solid-solid mixture. (   )

4 Answer the following questions:

1. **Classify the following into a physical or chemical change:**
   - a. Car rusting. (..........................)
   - b. Condensation of water vapor. (..........................)
   - c. Cutting an apple in halves. (..........................)

2. **Write the type of each mixture and the way of separation.**

a. Mud and water

Type: ....

Way of separation: ....

b. Iron filings and sand

Type: ....

Way of separation: ....

Part 2

Guiding Models

Contents:



October Guiding Models

Model 1

Answer Guide: P. 74

(Total mark) 20

1 Choose the correct answer:

1. .... carry/carries blood from the heart to all the body parts.
   a. Arteries b. Veins c. Lungs d. Phloem
2. All the following are ecosystems, except ....
   a. desert b. tundra c. rainforest d. space
3. All the following are from the plant basic needs except ....
   a. water b. air c. soil d. sunlight
4. Identify the correct order of this food chain ....
   a. Owl ⟶ Frog ⟶ Grasshopper ⟶ Grass
   b. Frog ⟶ Owl ⟶ Grass ⟶ Grasshopper
   c. Grass ⟶ Grasshopper ⟶ Owl ⟶ Frog
   d. Grass ⟶ Grasshopper ⟶ Frog ⟶ Owl
5. Photosynthesis process takes place in the ....
   a. stem b. leaves c. roots d. xylem

2 Complete the following sentences, using words between brackets:

1. Veins carry blood rich in .... (oxygen – carbon dioxide)
2. Plants are .... that get energy from the sunlight to make their own food. (decomposers – producers)
3. .... transports the the food of the plant from the leaves to all the parts of the plant. (Xylem – Phloem)
4. The consumer that feeds on an animal which in turn feeds on producers is called a .... consumer. (primary – secondary)
5. Any food chain begins with producers and ends with .... (producers – decomposers)

3 Put (✓) or (X) in front of each sentence:

1. Energy does not flow between two consumers at the beginning of a food chain. (   )
2. Soil is among the basic needs of a plant. (   )
3. Seeds with good taste can be eaten and dispersed by animals. (   )
4. Grass and Snake, is a "Prey-Predator" relationship. (   )
5. Sunlight is not important for the plant's growth. (   )

4 (A) Write the scientific term for each of the following:

1. The transfer of seeds from one place to another. (..............................)
2. It is a model that shows a linear set of feeding relationships and energy movement among living things within specific species. (..............................)

(B) Answer the following questions:

1. Plants are very important for other living organisms. Explain.

....

....

2. Plants' roots play a very important role for the plants' survival. Explain.

....

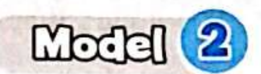
....

3. Arrange the following food chain (1 - 3):

....

Assess Your Performance

From 1% to 50% Weak | From 51% to 65% Fair | From 66% to 85% Good | From 86% to 100% Exceeds expectation



(Total mark) 20

1 Choose the correct answer:

1. The .... is/are the reproductive part(s) of the plant.
   a. flower b. stem c. leaves d. roots
2. All of the following are from the components of the human circulatory system except ....
   a. heart b. veins c. arteries d. phloem
3. An ecosystem consists of ....
   a. living organisms only b. non-living things only
   c. living organisms and non-living things d. No correct answer.
4. A grasshopper eats grass and seeds, then a bird eats the grasshopper. This is an example of a/an ....
   a. insectivore b. food chain c. carnivore d. food web
5. Dandelion seeds are light and feathery that are able to disperse by ....
   a. water b. air c. animals d. phloem

2 Put (✓) or (✗) in front of each sentence:

1. The human circulatory system transports water, oxygen and nutrient throughout the human body. ( )
2. Hyenas, Vultures, Crabs and Houseflies are examples of scavengers. ( )
3. Xylem vessels transport water and minerals in all directions. ( )
4. The predator is the consumer eaten by another consumer. ( )
5. The plant absorbs carbon dioxide from the air to make its own food. ( )

3 Complete the following sentences, using words between brackets:

1. Plants produce .... during photosynthesis that helps them grow, heal and reproduce. (oxygen – glucose)
2. .... consume the remains of dead animals and plants. (Consumers – Decomposers)
3. .... is a miniature plant waiting for the suitable conditions to grow. (Seed – Bud)



4. In longer food chains, ... are classified into primary, secondary and tertiary.
(producers – consumers)

5. The .... captures sunlight to help the plant do photosynthesis.
(chlorophyll – flower)

4 **(A) Write the scientific term for each of the following:**

1. The plant part that supports it and holds the leaves. (..................)
2. They are animals that eat plants. (..................)
3. The process by which the plant combines water, carbon dioxide in the presence of sunlight to make their own food. (..................)

(B) Answer the following questions:

1. What will happen if a plant is left in a dark room for several days?

....

....

2. Which of the following is the correct order for the food chain?

ⓐ → → →

ⓑ → → →

ⓒ → → →

Assess Your Performance

From 1% to 50%	From 51% to 65%	From 66% to 85%	From 86% to 100%
Weak	Fair	Good	Exceeds expectation

November Guiding Models

Model 1

Answer Guide: P. 74

(Total mark) 20

1 Choose the correct answer:

1. Which of the following affects ecosystems and causes species extinction?
   a. The habitat loss.
   b. Plastic pollution.
   c. Drought.
   d. All the previous answers.
2. .... is the property that can be used to describe objects.
   a. Shape
   b. Size
   c. Temperature
   d. All the previous answers
3. Healthy habitat means ....
   a. providing organisms with nutrients only
   b. providing organisms with shelter only
   c. increasing the pollutants in the ecosystem
   d. Both (a) and (b)
4. Water vapor rising from a kettle represents a .... state.
   a. solid
   b. liquid
   c. gaseous
   d. plasma
5. Particles of air inside your lungs ....
   a. move faster than solids
   b. move very freely
   c. vibrate
   d. No correct answer

2 Complete the following sentences, using words between brackets:

1. .... destroy the ocean food webs. (Water pollutants – Soil pollutants)
2. Liquid particles have .... energy than solid particles. (less – more)
3. In food webs, sea turtles are considered .... (producers – consumers)
4. .... is the building unit of matter. (Object – Particle)
5. .... are transferred from the producers to the consumers within the food chain. (Energy – Pollution)

3 Put (✓) or (X) in front of each sentence:

1. Gases take the space and shape of their container. ( )
2. Environmental changes that occur on land affect the organisms that live in the water. ( )
3. Everything around us that we can see or touch is made up of matter, including us. ( )
4. Each blood cell is made up of a single particle. ( )
5. Rising temperatures destroy coral reefs. ( )

4 (A) Write the scientific term for each of the following:

1. Small particles of plastic products harm the marine organisms. (..........)
2. A state of matter whose particles are tightly packed. (..........)
3. They live on the surface of the sea and need cold water to survive. (..........)

(B) Answer the following questions:

1. Plastic products cause marine organisms to starve, which sentence explains the previous sentence?

a. Plastic takes up space in the water so marine animals have no place to live. ☐

b. The plastic in the ocean is so dense that the marine animals cannot find food easily. ☐

c. Some marine animals eat a lot of plastic thinking it is jellyfish. ☐

2. How do you think we can change water from liquid state to solid state?

Liquid → Solid

....

Assess Your Performance

From 1% to 50%	From 51% to 65%	From 66% to 85%	From 86% to 100%
Weak	Fair	Good	Exceeds expectation

Model 2

(Total mark) 20

1 Complete the following sentences, using words between brackets:

1. Matter .... from one state to another. (never changes – can change)
2. .... is a state of matter that has closely packed neatly arranged particles. (Gas – Solid)
3. If species is exposed to a habitat loss, its population .... (increases – decreases)
4. Snow changes into water, by .... process. (heating – cooling)
5. Most coral reefs are found in .... areas away from the shore. (warm – cold)

2 Put (✓) or (✗) in front of each sentence:

1. Sea animals eat plastic because it has more nutritional value than their real food source. (   )
2. Steam is the liquid form of water. (   )
3. Coral bleaching is caused by the increase in the temperature of fresh water. (   )
4. Solids, liquids, and gases are similar as they all take up space. (   )
5. Coral bleaching occurs due to swimming people in the ocean. (   )

3 Choose the correct answer:

1. All the following are different forms of matter except ....
   a. solid b. liquid c. planet d. gas
2. How many tonnes of plastic enter the ocean every year?
   a. 8 million. b. 10 million. c. 20 million. d. 300 million.
3. Liquid particles are ....
   a. free b. tightly packed c. loose d. No correct answer.
4. Which of the following is not a cause of a habitat destruction?
   a. Burning forests. b. Cutting trees to make paper.
   c. Clearing forests to be used for farmland. d. Migration of birds.
5. Which of the following examples can be poured and has particles that can slide past each other?
   a. Iron rod. b. Milk. c. Oxygen. d. Chair.

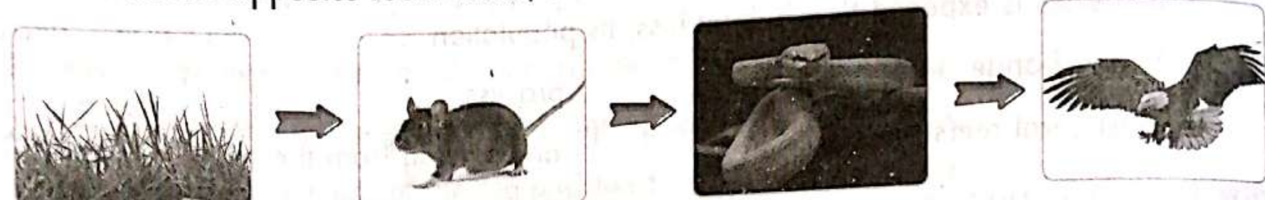
4 **(A) Write the scientific term for each of the following:**

1. It is an introduced organism that becomes overpopulated and harms its new environment. (..................)

2. A state of matter that has a lot of space among its particles. (..................)

(B) Answer the following questions:

1. Look at the opposite food chain, then answer:



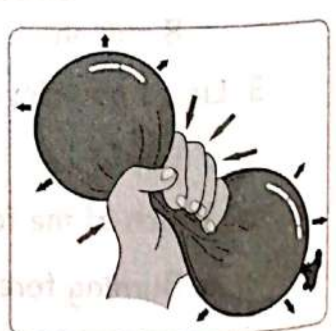
a. What would happen to the snake population if the eagle population suddenly decreased due to disease?

1. It would increase.
2. It would stay the same.
3. It would decrease.

b. What would happen to the mouse population if the eagle population suddenly decreased due to disease?

1. It would increase.
2. It would stay the same.
3. It would decrease.

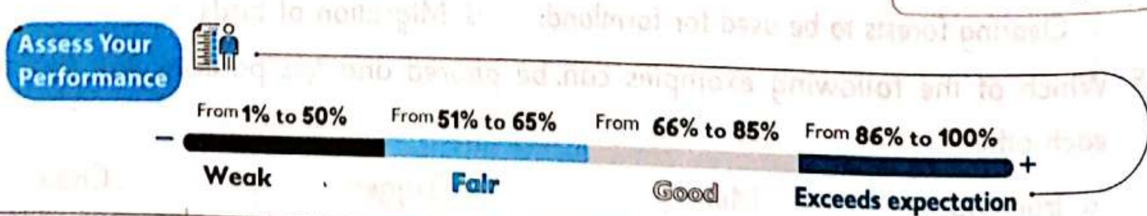
2. When we squeeze a balloon, it pops. Why?



....

....

....



Model 3

(Total mark) 20

1 Choose the correct answer:

1. All the following sentences describe decomposers except ....
   a. organisms that feed on dead animals
   b. organisms that feed on plants
   c. organisms that recycle all energy back into the ecosystem
   d. organisms that obtain food from the remains of other organisms
2. Food webs are found in ....
   a. desert
   b. rain forest
   c. oceans
   d. All the previous answers.
3. .... can keep their shape unless an action is done to break/or change them.
   a. Gases
   b. Solids
   c. Liquids
   d. Plasmas
4. How helpful a model can be?
   a. Models give us step-by-step instructions about how to build something.
   b. Models can help us see things that are too small or too big to observe.
   c. Models make something look better than it does in real life.
   d. Models always make something smaller than it is in real life.
5. Pollution causes .... to the food web.
   a. that the food becomes rare for another species
   b. escaping of some animals to another places
   c. increasing the number of producers
   d. Both (a) and (b)

2 Put (✓) or (✗) in front of each sentence:

1. The three states of matter have the same properties. (   )
2. Ice cubes can be poured, while water can't. (   )
3. The states of matter depend on the arrangement of particles in a substance. (   )
4. Light and sound are not states of matter. (   )
5. When water contaminates, the sea birds move to another place to find food. (   )

3 Complete the following sentences, using words between brackets:

1. .... particles are packed tightly together. (Solid – Liquid)
2. Adding roads .... the habitats. (destroys – improves)
3. The three states of water look .... (alike – different)
4. .... is catching fish at a higher rate. (Overfishing – Pollution)
5. The particles of gases .... (move more freely – vibrate)

4 (A) Write the scientific term for each of the following:

1. It is anything that has mass and volume. (..................)
2. It shows a complex feeding relationship between different organisms. (..................)
3. It is a copy that is similar to a real thing. (..................)
4. It provides the organisms with the necessary needs. (..................)

(B) Classify the following particles into "Solid, Liquid and Gas":

1 .... 2 .... 3 ....

Assess Your Performance

From 1% to 50%	From 51% to 65%	From 66% to 85%	From 86% to 100%
Weak	Fair	Good	Exceeds expectation



Performance Tasks

Contents:

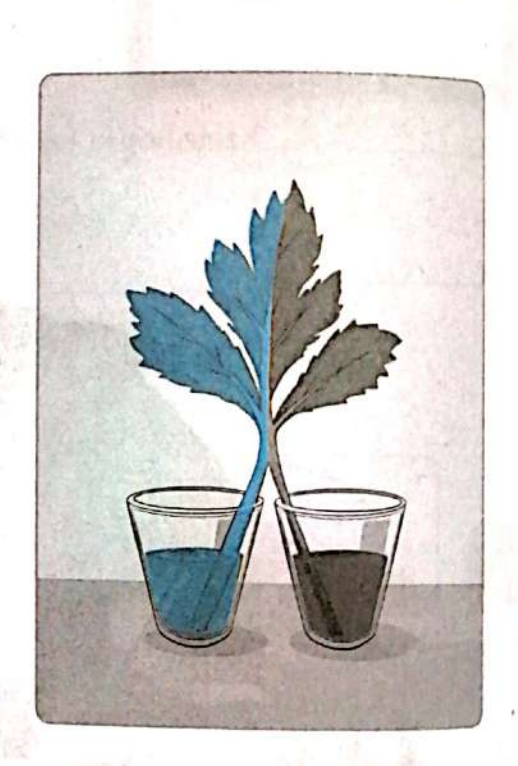
Al-Adwaa Performance Tasks Models

Answer Guide: P. 75

Model 1 Importance of Plant Parts

(A) Look at the following figure, then answer:

Seba cut a celery stalk into two halves. She put one half in red colored water and the other half in a blue colored water. She left the stalk for 9 hours.



1. What does the celery look after 9 hours?

....

....

2. Why does it look like this?

....

....

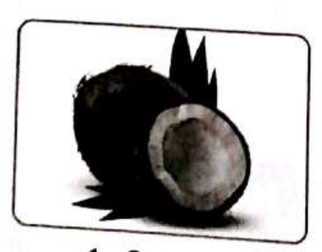
3. If Seba leaves a white flower in green colored water for 9 hours. What will she observe?

....

....

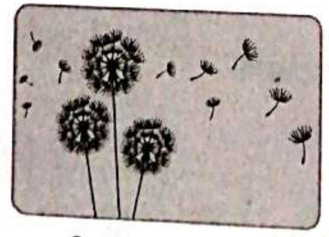
(B) Read the words in the box to show how each seed is dispersed:

(Wind – Fur – Water – Eaten by animals)



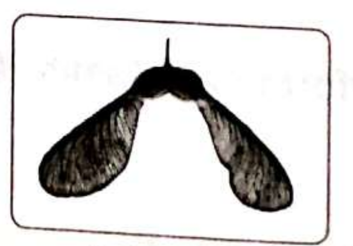
1. Coconut

....



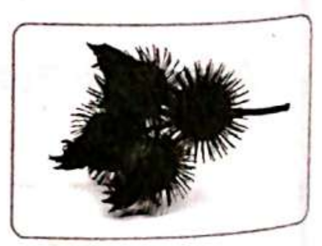
2. Dandelion

....



3. Maple

....



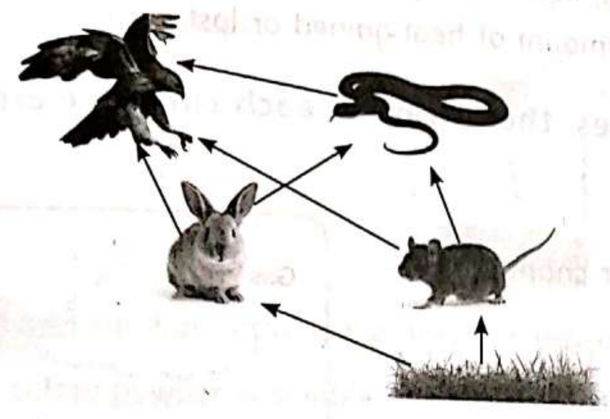
4. Burdock

....



Model 2 Food web

- In the food web pictured on the left, energy is passed from the grass to the mouse to the snake to the hawk.



Producers are living organisms that make their own food.
Consumers are living organisms that eat other living organisms.

- Use the food web in the picture above to answer the questions.

1. Name the living organisms in the food web that are producers. (..............................)
2. Name the living organisms in the food web that are consumers. (..............................)
3. Which living organisms are eaten by the snake? (..............................)
4. Which living organisms are eaten by the hawk? (..............................)
5. What is eaten by the rabbit? (..............................)

Model 3 Predator and Prey

- A predator is an animal that hunts other animals for food.
- Prey is an animal that is hunted and eaten by another animal.

Identify the predator and prey for each of the following:

1. A seagull lands near an alligator and the alligator eats it.
   - Predator (..............................) - Prey (..............................)
2. A gray wolf hunts and eats a rabbit.
   - Predator (..............................) - Prey (..............................)
3. A blue whale swallows Krill.
   - Predator (..............................) - Prey (..............................)
4. A penguin is caught and eaten by a leopard seal.
   - Predator (..............................) - Prey (..............................)

Model 4 Matter and its Properties

- Water can be found in three states (solid, liquid and gas). Water can change among the three state easily depending on the amount of heat gained or lost.

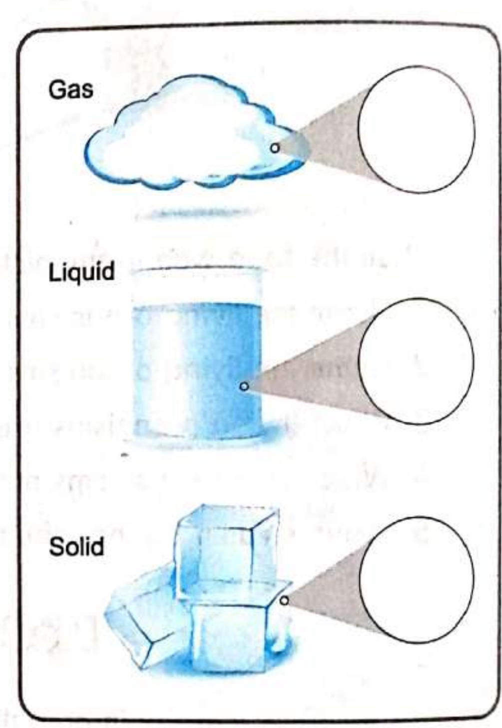
(A) Complete the following sentences, then draw in each circle the arrangement of water molecules in each state:

1. During .... process, water changes into water vapor by ....

2. During .... process, ice cubes change into water by ....

3. During .... process, water vapor molecules lose energy and become closer to each other.

4. During freezing, water molecules .... energy and become more closer to each other.



(B) Circle the suitable answer:

1. We can measure the dimensions of an ice cube using:



(Measuring ruler – Measuring cup)

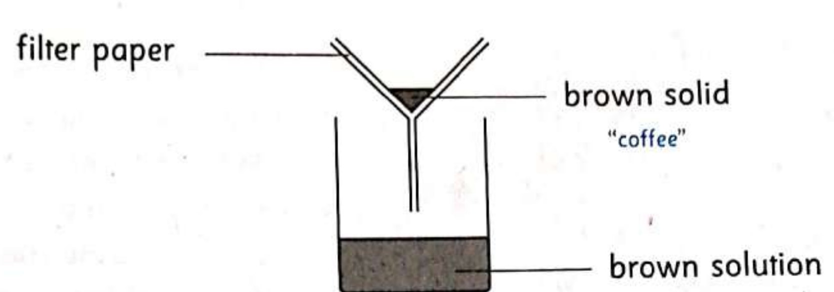
2. We can measure the volume of water using:



(Balance – Measuring cup)

Model 5 Separating of mixtures

- Tamer filtered the mixture of coffee and water



- Circle the statement that explains the previous process:

a. All the coffee powder is soluble.

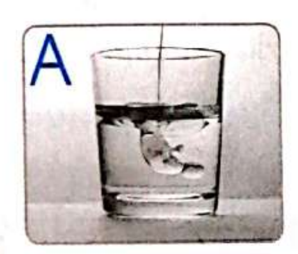
b. Some of the coffee powder is insoluble.

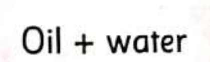
c. All the coffee powder is insoluble.

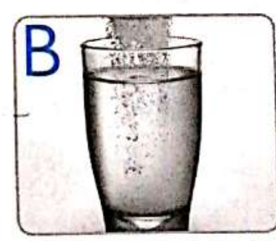
d. Some of the coffee powder is frozen.

Model 6 Physical and chemical changes

- Yasmin made the following mixtures in her kitchen.



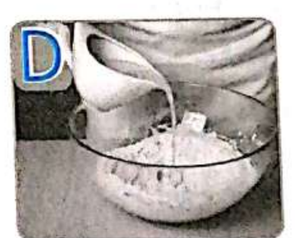




Salt + water



Baking soda + vinegar



Adding yeast to dough

a. Complete the table to show what happens to each one of the mixtures.

Tick (✓) the correct box for each mixture.

Mixture	Doesn't react and doesn't make a new substance	Reacts and makes a new substance
(A)		
(B)		
(C)		
(D)		

b. Which is irreversible change, and why?

....

c. Write down how she could get salt back from mixture.

....

Part 4

Exams

Contents:



Al-Adwaa Model Exams on the First Term

Model 1

Answer Guide: P. 76

(Total mark) 30

1 Choose the correct answer:

1. You can scientifically describe "atmospheric air" as: ....
   a. a pure substance in a gaseous state and its molecules are close together
   b. a mixture consisting of several gases in equal proportions
   c. a mixture consisting of several gases in different proportions
   d. not a substance
2. The gas produced by the photosynthesis process is consumed by living organisms in the .... process.
   a. photosynthesis b. respiration c. sensation d. All the previous answers.
3. If the predators disappear from an ecosystem, ...
   a. this ecosystem is not affected b. the number of prey increases
   c. the prey dies of starvation and the ecosystem is disturbed
   d. plants and herbs grow faster
4. Iron is used in ....
   a. electrical wires b. car bodies and bridges
   c. cooking utensils d. tires for cars and planes

2 Complete the following sentences, using words between brackets:

1. The potato plant contains a type of stem known as ....(woody stems – tuberous stems)
2. One of the factors that negatively affect the food web is.................... .
   (extinction of species – adaptation of species)
3. Green plants can be classified as .... (producers – decomposers)
4. Water vapor is an example of a substance in the .... state. (liquid – gaseous)

3 Put (✓) or (✗) in front of each sentence:

1. Metal rusts due to chemical changes that occur to the material. (   )
2. Soil is one of the basic needs of plants. (   )
3. Balloons are filled for celebrations with oxygen gas or carbon dioxide. (   )
4. The solid particles are assembled and arranged in a regular shape. (   )

4 (A) Write the scientific term for each of the following:

1. It is the change of matter from the gaseous state to the liquid state, by cooling. (....................)
2. It is a model that shows a linear set of feeding relationships and energy movement among living things within specific species. (....................)

(B) Decomposing organisms such as fungi and bacteria plays an important role in the environment. Explain ....

Model 2

(Total mark) 30

1 Choose the correct answer:

1. All the following are products of the photosynthesis process except ....
   a. oxygen b. carbon dioxide c. glucose d. protein
2. All of the following are from the physical properties of matter except ....
   a. texture b. temperature
   c. density d. rusting
3. When the particles of a solid gain energy, they ....
   a. converge more and arrange regularly b. get more coherent
   c. diverge and move more freely
   d. are not affected by this energy and remain in a solid state
4. Which of these materials has a definite shape and takes up space? ....
   a. Water vapor b. Wood c. Oil d. Helium gas
5. Food webs show the interactions between ....
   a. a small number of living organisms b. living and non-living components of an ecosystem
   c. some interconnected food chains d. producers, consumers, and decomposers

2 Complete the following sentences, using words between brackets:

1. In many food chains, the rabbit is an example of ....
   (first consumers – third consumers)
2. The reproductive organ in many plants is the .... (flower – root)
3. Wax melting is an example of the .... change of matter. (physical – chemical)
4. Snow differs from water in .... (composition – physical state)
5. The mixture of sand and water can be separated by .... (filtration – magnet)

3 (A) Put (✓) or (✗) in front of each sentence:

1. Temperature affects the mass of a substance. (   )
2. The measuring tape is used to measure dimensions of the school class. (   )
3. Sticky seeds are easily carried by the wind. (   )

(B) 1. Arrange the following organisms to form a food chain:

(small bird – locust – snake – grass – hawk)

- ....

2. If the grass is removed from a food chain, the food chain will be destroyed in this ecosystem. Explain.

- ....

Model 3

(Total mark) 30

1 Choose the correct answer:

1. Copper molecules are similar to iron because ....
   a. they are easily visible to the naked eye
   b. they are convergent and arranged in a regular order
   c. they move more freely
   d. they have indefinite shape
2. The parts of the plant that absorb sunlight to complete the process of photosynthesis are ....
   a. stems
   b. leaves
   c. root hairs
   d. flowers
3. Which of these options could be the correct order of a food chain? ....
   a. Mouse ⟶ Hawk ⟶ Snake ⟶ Grass
   b. Grass ⟶ Rat ⟶ Hawk ⟶ Snake
   c. Grass ⟶ Locust ⟶ Frog ⟶ Snake
   d. Locust ⟶ Mouse ⟶ Snake ⟶ Nest
4. Which of the following does not express the properties of mixtures? ....
   a. They exist in a solid, liquid, or gaseous state
   b. Their components are physically combined
   c. They react with each other
   d. Their components can be separated easily
5. When an organism disappears from a balanced ecosystem, it affects ....
   a. other organisms that feed on it
   b. the food webs of this ecosystem
   c. the energy that flows between living organisms
   d. All the previous answers

2 Complete the following sentences, using the given words:

(xylem – physical – chemical – gaseous – Liquid – food web – energy)

1. The .... vessels transport water and nutrients from the root to all parts of the plant.
2. .... substance can be poured, and it takes the shape of the container in which it is placed.
3. A person needs more .... when making physical effort or practicing sports activities.
4. A .... change of a substance leads to the formation of new substances.
5. A group of interconnected food chains is known as a ....

3 (A) Put (✓) or (✗) in front of each sentence:

1. Sticky seeds are easily transmitted by insects. ( )
2. When the temperature of water vapor decreases, it loses energy. ( )
3. Any substance consists of particles in a state of continuous motion. ( )

(B) Mention one use for each of the following:

1. Thermometer ....
2. Copper ....

Model 4

(Total mark) 30

1 Choose the correct answer:

1. The plant needs air in the photosynthesis process using ....
   a. root b. xylem c. phloem d. stomata
2. .... are organisms responsible for returning nutrients into the soil.
   a. Producers b. Consumers c. Decomposers d. Autotrophs
3. When a piece of ice is exposed to sunlight directly, its particles ....
   a. lose energy and turn into liquid water
   b. gain energy and get closer
   c. lose energy, and their composition changes
   d. gain energy and turn into liquid water
4. Which of the following is not a physical change of matter? ....
   a. Cutting paper
   b. Dissolving a mold of sugar in water
   c. Producing yogurt from milk
   d. Recycling paper
5. Matter that does not have a fixed volume and does not have a fixed shape is a ....
   a. solid b. liquid c. gas d. wood

2 Complete the following sentences, using words between brackets:

1. .... is the measure of how fast the particles move in a substance. (Mass – Temperature)
2. The blood vessels that carry blood with oxygen and glucose to all parts of the body are .... (arteries – veins)
3. A group of interconnected food chains are called ....(food webs – ecosystems)
4. In celebrations, balloons are filled with helium gas because it has .... than the air. (less density – more density)
5. The unit that is used to measure the mass of chemicals used during experiments is called .... (milliliter – gram)

3 (A) Write the scientific term for each of the following:

1. The substance that gives plants their green color and absorbs sunlight to complete the process of photosynthesis. (................)
2. It is any increase or decrease in the number of organisms in an area. (................)
3. The process of converting a substance from a liquid state to a solid state by cooling. (................)

(B) Coral reefs are one of the most diverse and valuable ecosystems on earth. Explain.

Model 5

(Total mark) 30

1 Choose the correct answer:

1. .... is responsible for transporting glucose and oxygen to all human body parts.
   a. The digestive system
   b. The circulatory system
   c. The respiratory system
   d. The nervous system
2. The property that made rubber the most suitable material for making bicycle and car tires is ....
   a. water resistance
   b. high flexibility
   c. high hardness
   d. Both (a) and (b)
3. Which of these organisms does a food chain start with in a desert ecosystem? ....
   a. Locusts
   b. Grass
   c. Hawk
   d. Coral reefs
4. All the following are evidences of a chemical change of substance except ....
   a. the appearance of gas bubbles
   b. the formation of sediments or new materials
   c. the change of the substance from the solid state to the liquid state
   d. the strong smell and high temperature.

2 Complete the following sentences, using words between brackets:

1. The part(s) of the plant that is/are responsible for absorbing water and nutrients from the soil is/are .... (root hairs – phloem)
2. The particles of matter converge to each other and arrange in regular order in the .... state. (solid – liquid)
3. We can reduce the amount of plastic in aquatic ecosystems by .... (increasing use – recycling)
4. The mass of a mixture of several substances.............................. the sum of the masses of the substances before mixing. (is greater than – is equal to)

3 Correct the underlined words:

1. The property that determines if a body floats or sinks in a liquid is <u>temperature</u>.
2. Grinding sugar is considered a <u>chemical</u> change in the substance.
3. Plants make their food in the <u>absence</u> of sunlight.
4. The <u>thermometer</u> is used to measure the volume of liquid substances like oil.

4 Look at the opposite figure, then answer:

1. The figure expresses the .... process. (predation – decomposition)
2. The prey and predator in this food chain are .... (consumers – producers)
3. Describe what will happen when snakes disappear from a balanced ecosystem.
   ....
   - ....

Model 6

(Total mark) 30

1 Choose the correct answer:

1. The process by which a plant makes its own food and produces oxygen gas is known as: ....
   a. respiration b. photosynthesis c. osmosis d. transportation in plants
2. The ecosystem consists of........ .
   a. living organisms only
   b. non-living things only
   c. living organisms and non-living things
   d. No correct answer.
3. When the water temperature rises to 90°C, ...
   a. its molecules lose energy and move more
   b. water evaporates and turns into a gaseous state
   c. its molecules get close to each other, and the water remains liquid
   d. its molecules lose energy, and their composition changes
4. Which of the following substances is represented by its molecules in this form?
   a. Helium gas.
   b. Copper.
   c. Water vapor.
   d. Vinegar.
5. A long, dry season in a rainforest produced below-average rainfall, and some plant populations declined afterwards. Why did the change in weather pattern affect plants' growth in the region? ....
   a. As the dry season causes the temperature in the area to drop.
   b. As the dry season causes the soil to become less nutrient-rich.
   c. As the dry season reduces the amount of water in the ground.
   d. As the dry season causes less sunlight to reach the ground.

2 Complete the following sentences, using words between brackets:

1. Reptiles and birds are creatures that .... food. (produce – consume)
2. The property that helps us to use glass in medical glasses is .... (it is a transparent material – it is a good conductor of heat)
3. The transformation of a substance from a solid state to a liquid by heating is .... (melting – condensation)
4. When pollution occurs within an environmental system, it negatively affects food webs and energy transfer........ . (continues – is destroyed)
5. Throwing plastic in water is one of the .... impacts of human activities. (positive – negative)

3 Put (✓) or (✗) in front of each sentence:

1. The function of the vascular system in a plant is similar to that of the digestive system in humans. (   )
2. Energy is transferred from one organism to another living organism within an ecosystem. (   )
3. Air consists of gaseous mixtures. (   )
4. Liquid substances have definite shapes and take up space. (   )
5. Temperature neither affects the state of matter nor its particles motion. (   )

Model 7

(Total mark) 30

1 Choose the correct answer:

1. Plants use energy from .... to make their own food.
   a. batteries b. fire c. sunlight d. wind
2. Combination of two or more substances that are not chemically combined is called ....
   a. compound b. mixture c. mass d. volume
3. Energy, in the form of food, flows from one organism to another. Which is the correct direction of this energy flow? ....
   a. From producers to consumers
   b. There is no energy flow between producers and consumers
   c. Back and forth between consumers and producers
   d. From consumers to producers
4. Matter is ....
   a. only liquids b. anything that has mass and takes up space
   c. only water in different states d. only solids
5. All the following are from the chemical properties of matter, except ....
   a. ability to react with another material b. size
   c. flammability d. rusting

2 Complete the following sentences, using words between brackets:

1. The plant stores chemical energy in the form of .... (sugars – oxygen)
2. Particles of a matter are in a .... state. (motion – static)
3. The primary source of energy is the .... (green plants – sun)
4. Heavy rains .... the desert habitat. (develop – destroy)
5. The particles of .... vibrate only and do not move from their places. (solids – gases)

3 Put (✓) or (✗) in front of each sentence:

1. Stomata in the plants' leaves act as the respiratory system in humans. (   )
2. By increasing temperature, the particles of matter lose energy and become faster. (   )
3. In food web, all energy is transferred from one organism to another while feeding on it. (   )
4. Liquids can be poured, while solids can't. (   )
5. One kilogram is equal to 1000 ml of distilled water. (   )

Model 8

(Total mark) 30

1 Choose the correct answer:

1. Which of the following represents a "prey-predator" relationship? ....
   - a. Grass and snake
   - b. Snake and mouse
   - c. Owl and green plant
   - d. All the previous answers
2. Which of the following materials has a fixed shape and a fixed volume? ....
   - a. Solid
   - b. Liquid
   - c. Gas
   - d. All the previous answers
3. .... are the factors which decrease the population number of species in an area.
   - a. Suitable climate changes
   - b. Migration of living organisms
   - c. Unsuitable climate changes
   - d. Both (b) and (c)
4. All the following are from the properties of mixture except ....
   - a. its component can't be separated easily
   - b. its components keep their own properties
   - c. its components can be separated easily
   - d .its components are mixed physically
5. Electrical wires are usually covered with a layer of plastic, because ....
   - a. it helps electricity flow along the wire
   - b. it doesn't allow electricity to pass through it
   - c. it makes the electric wires safe
   - d. Both (b) and (c)

2 Complete the following sentences, using words between brackets:

1. Any food chain begins with a .... (producer – decomposer)
2. Snow, water, and water vapor are examples of .... (one object – different objects)
3. .... has a bad effect on ecosystem. (Drought – Recycling)
4. The boiling point of water is .... (0°C – 100°C)
5. .... is not consider a plant basic need. (Air – Soil)

3 Put (✓) or (✗) in front of each sentence:

1. When coral reefs get rid of algae existed in their tissues, they become red. ( )
2. The burning wood can return again to its original shape. ( )
3. Both plants and humans need gases to survive. ( )
4. Water and minerals move from up to down through the xylem vessels. ( )
5. Veins carry blood rich in carbon dioxide and low in oxygen to the heart. ( )

Model 9

(Total mark) 30

1 Choose the correct answer:

1. .... energy from the sun is changed into .... energy during photosynthesis.
   a. Chemical energy - light energy
   b. Light energy - chemical energy
   c. Thermal energy - light energy
   d. Electrical energy - chemical energy
2. How are solids unique from other forms of matter? ....
   a. Solids take the shape of any container
   b. Solids have a definite size and shape
   c. Solids can be poured
   d. No correct answer.
3. All matter is made of ....
   a. cells
   b. proteins
   c. particles
   d. muscles
4. Colored coral is an example of .... habitat.
   a. healthy
   b. dying
   c. unhealthy
   d. No correct answer.
5. All the following are mixtures except ....
   a. cement
   b. milk
   c. flour
   d. soya sauce

2 Complete the following sentences, using words between brackets:

1. Stomata allow air rich in .... to be released from the leaves. (oxygen – carbon dioxide)
2. Any food chain begins with producers and ends with .... (producers – decomposers)
3. Iron is attracted to the magnet. This is an example of a .... property. (physical – chemical)
4. Iron reacts with .... in the air and gets rusted. (oxygen – nitrogen)
5. Scientists use .... to study phenomena that might be difficult to observe directly. (models – reports)

3 Put (✓) or (✗) in front of each sentence:

1. Seeds play an important role in the plant's survival and continuity. ( )
2. Without decomposers, the Earth would be full of dead bodies. ( )
3. When the volume of matter increases, its density increases. ( )
4. During changing liquids into solids the particles move away from each other. ( )
5. Coral bleaching has a positive impact on coral reef. ( )

Model 10

(Total mark) 30

1 Choose the correct answer:

1. Electric wire is usually made up of copper, ...
   a. because copper is a bad conductor of heat
   b. because copper is a good conductor of heat
   c. because copper is a bad conductor of electricity
   d. because copper is a good conductor of electricity
2. .... is/are the green pigment in chloroplasts that captures the energy in sunlight.
   a. Chlorophyll b. Stomata c. Phloem d. Xylem
3. The rising of water vapor from the cooking pot represents a .... substance.
   a. solid b. liquid c. gaseous d. No correct answer
4. Wolves prefer to hunt deer for food. If the deer population in an area declines because of hunting by humans, the wolves would most likely ....
   a. find an area with more deer b. start to attack human hunters
   c. become endangered and then extinct d. choose another food to eat
5. .... is the gaseous state of water.
   a. Ice b. Vapor c. Water d. Wax

2 Complete the following sentences, using words between brackets:

1. The temperature of boiling water is measured by a .... (scale – thermometer)
2. .... transports sugars, starch and fats produced in the leaves to all the plant's parts. (Xylem – Phloem)
3. When liquid water is placed in the refrigerator, the movement of particles becomes .... (slower – faster)
4. The consumer eaten by another animal is called a .... (predator – prey)
5. Throwing plastic in water is one of the .... impacts of human activities. (positive – negative)

3 Put (✓) or (✗) in front of each sentence:

1. All kinds of matter have the same chemical and physical properties. ( )
2. Veins carry blood rich in carbon dioxide and low in oxygen to the heart. ( )
3. The states of matter depend on the arrangement of particles in a substance. ( )
4. Scavengers consume the remains of dead animals and plants. ( )
5. It is very hard to separate salt from water in salty water mixture. ( )

Model 11

(Total mark) 30

1 Choose the correct answer:

1. Which of these factors negatively affects food webs?
   - a. The extinction of a species.
   - b. The recycling of things.
   - c. The adaptation of living organisms to environmental changes.
   - d. The preservation of the habitat of living organisms.
2. Solids differ from other forms of matter in that they ....
   - a. take the shape of the container
   - b. have a fixed volume and a fixed shape
   - c. can spill like a liquid
   - d. have molecules move in all directions
3. The stomata exist on .... in the plant.
   - a. stems
   - b. leaves
   - c. root hairs
   - d. stems and leaves
4. In case of dissolving an amount of salt in a cup of water, ...
   - a. a new substance is produced
   - b. a chemical change occurs
   - c. a liquid mixture of salt and water is formed
   - d. the salt loses its taste

2 Complete the following sentences, using words between brackets:

1. From the units used to measure mass is .... (kilogram – liter)
2. The .... feeds on the remains of dead organisms. (producer – decomposer)
3. Ice and water are particles of .... (the same substance – two different substances)
4. The gas which is produced from the photosynthesis process is .... (oxygen – carbon dioxide)

3 Put (✓) or (✗) in front of each sentence:

1. Melting and reforming metals are from the physical changes of matter. (   )
2. Plants with upright stems grow vertically down like the stems of most flowers. (   )
3. The falcon is the first consumer in the food chain. (   )
4. Density is one of the chemical properties of a substance. (   )

4 Look at the opposite figure, then answer:

1. The figure expresses .... ecosystem. (deserts – tropical forests)
2. The figure represents a model for a .... (food chain - food web)
3. Describe what would happen if grass was removed from this ecosystem.

....

Model 12

(Total mark) 30

1 Choose the correct answer:

1. Plants use energy from sunlight to make their own food through a process called ....
   a. reproduction b. photosynthesis c. germination d. respiration
2. Which organism gets energy from another organism? ....
   a. A cactus b. An acacia tree c. A rabbit d. A flower
3. .... affects the food web.
   a. Increasing the number of a specific species
   b. Decreasing the number of a specific species
   c. The death of a specific species
   d. All the previous answers.
4. The particles of matter are very close to each other in the .... state.
   a. solid b. liquid
   c. gaseous d. All the previous answers.

2 Complete the following sentences, using words between brackets:

1. Fluffy seeds, like kapok tree seeds, can be dispersed by .... (wind – being eaten)
2. Particles of .... are packed tightly together. (solids – liquids)
3. .... is used in making electric wires. (Rubber – Copper)
4. We can separate the mixture of .... by filtering. (water and salt – sand and water)

3 Put (✓) or (✗) in front of each sentence:

1. When water turns into ice, the speed of movement of its particles increases. ( )
2. Wood is used in handles of cooking pans, as it is a good conductor of heat. ( )
3. Rusted iron and burning wood are examples of chemical changes. ( )
4. Solids and liquids both have definite shapes. ( )

4 Write the scientific term for each of the following:

1. Plants' structures that allow gases to get in and out of the leaves.
2. It is a model that shows a linear set of feeding relationships and energy movement among living things within specific species.
3. Any increase or decrease in the population number of a species.

Model 13

(Total mark) 30

1 Choose the correct answer:

1. Volume is the amount of .... that matter takes up.
   a. time b. space c. temperature d. water
2. How can a model be helpful? ....
   a. Models give us step-by-step instructions about how to build something
   b. Models make something look better than it does in real life
   c. Models always make something smaller than it is in real life
   d. Models can help us see things that are too small or too big
3. Which part of the plant plays a similar role in keeping the plant alive to the circulatory system in humans?
   a.Stem. b. Roots. c.Leaves. d. Flower.
4. .... is a community of living organisms, non-living things, and the environment.
   a.Habitat b.Ecosystem c. Food web d. Food chain

2 Complete the following sentences, using words between brackets:

1. The states of matter depend on the arrangement of .... in a substance. (proteins – particles)
2. The consumer eaten by another animal is called a .... (predator – prey)
3. Seeds with sweet taste, like seeds on the strawberry, are best dispersed by .... (wind – being eaten)

3 Put (✓) or (✗) in front of each sentence:

1. All kinds of matter have the same chemical and physical properties. (   )
2. Matter can change from one state to another. (   )
3. Producers are the first link in the food chain, while consumers are the final link. (   )
4. In food web, the energy transfers from a primary consumer to a producer. (   )

4 (A) Write the scientific term for each of the following:

1. It is a form of matter made of two or more different compounds mixed together physically. (....................)
2. A material that allows heat to pass easily through. (....................)

(B) Classify the following into chemical and physical changes:

1. Making a chair from wood. 2. Burning a piece of paper.

Model 14

(Total mark) 30

1 Choose the correct answer:

1. Photosynthesis occurs in the chloroplasts of plant cells. Which gas is released during this process?
   a. Nitrogen. b. Hydrogen. c. Oxygen. d. Carbon dioxide.
2. A food web shows the ....
   a. non-living features in the environment b. feeding relationships between organisms
   c. way that heat is trapped in an environment
   d. substances that contaminate the atmosphere
3. .... affects the food web.
   a. Increasing the number of a specific species
   b. Decreasing the number of a specific species
   c. The death of a specific species d. All the previous answers.
4. Anything that occupies a space is called ....
   a. matter b. mass c. volume d. gas

2 Complete the following sentences, using words between brackets:

1. Rubber is used to make the bottom of the sneakers, as it has .... as a physical property. (flexibility – heat conduction)
2. Melting a piece of wax is a .... change. (physical – chemical)
3. A .... is used to measure the dimensions of your class. (measuring tape – measuring cup)

3 Put (✓) or (✗) in front of each sentence:

1. Temperature neither affects the state of a matter nor the movement of its particles. ( )
2. Cutting wood into pieces changes its mass and density. ( )
3. Matter is made up of tiny particles that are in constant continuous motion. ( )
4. Food web is a model that shows a linear set of feeding relationships and energy flow among living organisms. ( )

4 (A) Write the scientific term for each of the following:

1. The process through which a solid changes into a liquid by heating. (................................)
2. Plant structures that anchor the plant in the soil. (................................)
3. A mixture of invisible gases. (................................)

(B) Xylem plays an important role in obtaining life-sustaining elements.
What will happen to the plant if there are no xylem vessels?

Model 15

(Total mark) 30

1 Choose the correct answer:

1. The mass of a substance changes when ....
   a. matter temperature changes
   b. matter state changes
   c. matter mixes with other substances that didn't react with one another
   d. the amount of matter in it changes
2. All the following are similarities between circulatory system in human and vascular systems in plant, except ....
   a. both are transport systems
   b. both transport water, nutrients, and dissolved substances
   c. both don't have vessels that transport substances in specific directions
   d. All the previous answers.
3. Plants are .... that get energy from the sun to make their own food.
   a.decomposers b. consumers c. producers d. non-living
4. Which of the following materials can't be poured?
   a. Water. b. Oxygen. c. Salt. d. Air.
5. Seeds that are dispersed by human: ....
   a. Can float on water
   b. Have sweet taste
   c. Have hooks or stiff hairs
   d. Have wing-like structures and are light

2 Complete the following sentences, using words between brackets:

1. Examples of the decomposing organisms are .... (plants and algae – fungi and bacteria)
2. The temperature does not affect the .... of the substance. (mass – physical state)
3. The air inside a balloon represents a .... substance. (solid – gaseous)

3 Put (✓) or (✗) in front of each sentence:

1. Helium gas is mixed with oxygen in cylinders for diving underwater. ( )
2. Food webs show interactions between interconnected food chains. ( )

4 (A) Write the scientific term for each of the following:

1. Materials that have fixed shapes and take up space. (.....................)
2. It is the number of organisms of one type of species living in an area. (.....................)
3. It is a change in the shape and the size of the matter only without forming new substance. (.....................)

(B) The cork floats on the water surface but the iron sinks. Explain. (.....................)

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